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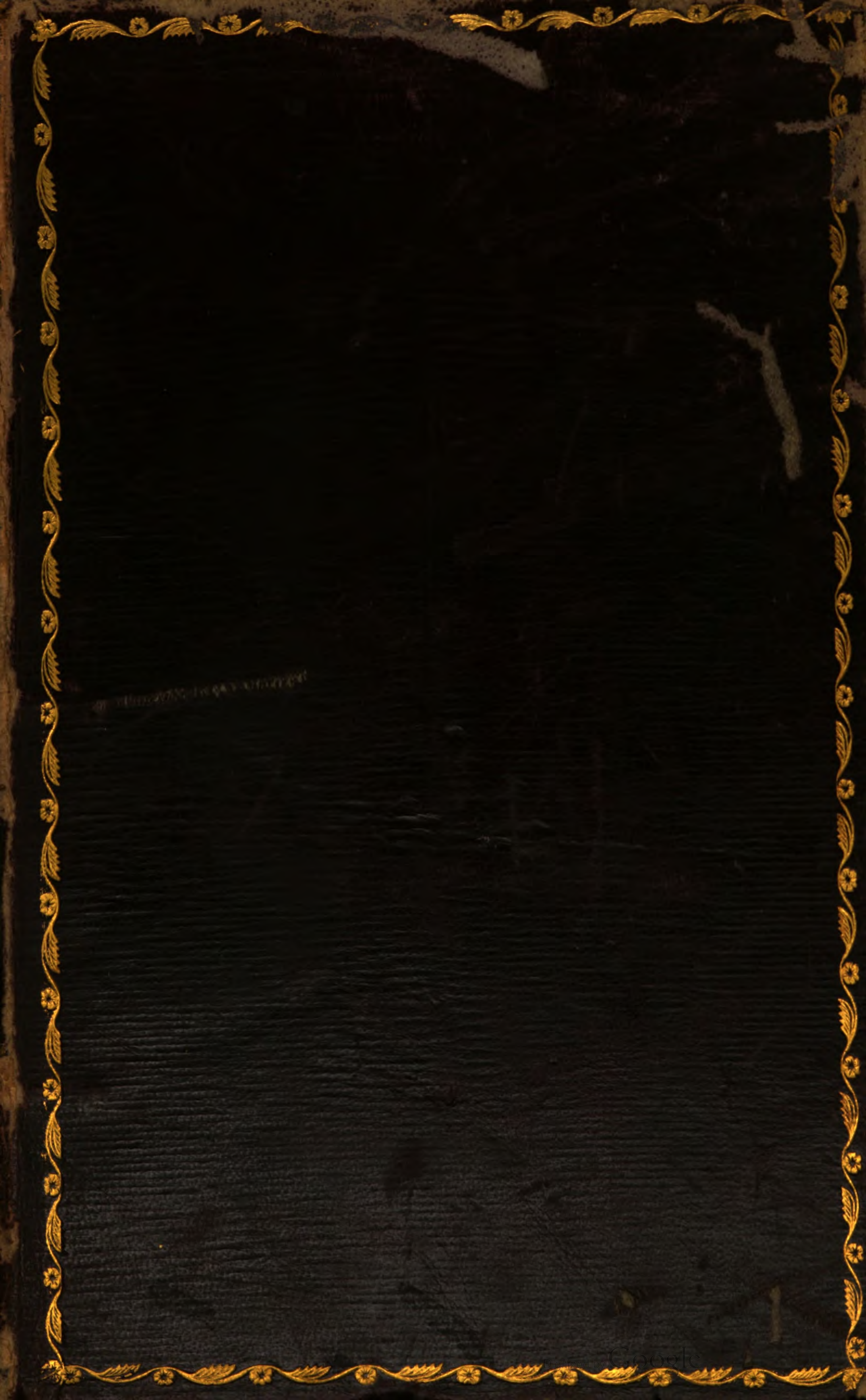

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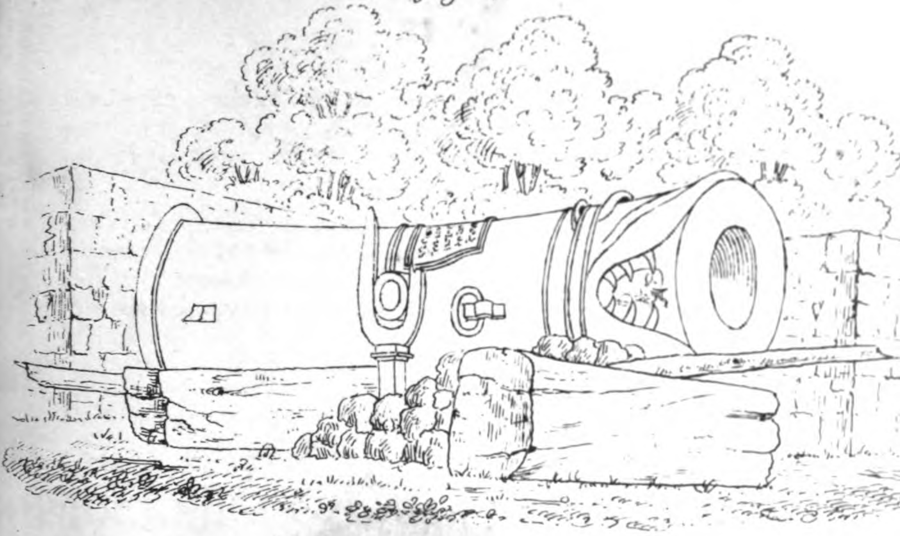
MADRAS
ARTILLERY RECORDS
VOLUME. 3.

Artillery.

fig 14.



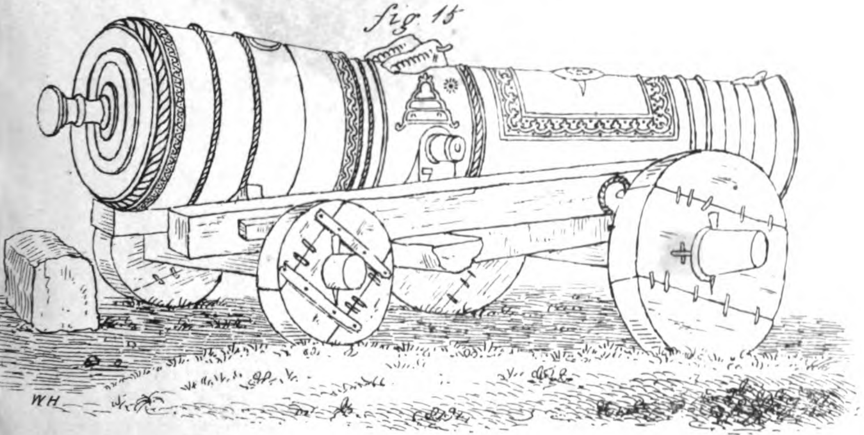
Beejapoor Gun.

ft in th
Length of Gun ——— 14 . 2 . 2
—„—— Bore ——— 7 . 11 . 7
—„—— Chamber —— 4 . 8 . 5

ft in th
Diam^r of Breech & Muzzle 4 . 4 . 9
—„—— Bore ——— 2 . 4 . 5
—„—— Chamber ——— 1 . 4 .

Weight of Gun —— 41 tons
—„—— Shot 3087 lbs.

fig 15



Bhurtpore Gun

ft in th
Length of Gun ——— 15 . 3 . 0
Diam^r of Breech ——— 3 . 3 . „
—„—— Muzzle ——— 2 . „ . .

PROCEEDINGS, SPECIAL BOARD OF ARTILLERY OFFICERS AT CALCUTTA

PROCEEDINGS OF THE SPECIAL BOARD OF ARTILLERY OFFICERS ASSEMBLED AT CALCUTTA, JULY 1836.

Minute by the Commander-in-Chief dated 15*th January* 1836.

1. The letter from the Military Secretary of the Madras Government to the Secretary of the Government in India, Military Department, dated 24th November 1835, shews a subject, which, from what I have learnt, appears to have been very long under discussion, without much approximation having been made towards a settlement of the question debated, and without grounds having presented themselves, on which to have such an arrangement, as may lead to a final and desirable result.

2. The subject to which the letter quoted immediately relates, is the equipment of field batteries, horse and foot in the Madras presidency.

3. A memorandum attached to that letter by the Secretary to the Supreme Government, Military Department, dated 18th December 1835, shews that the equipment ordered, will not be in accordance with the establishments of similar batteries on the Bengal establishment; the result therefore of approving what is proposed, will be longer to keep up a dissimilarity between Bengal and Madras Artillery; which I am of opinion ought not to be permitted to exist.

4. I will as briefly as I can, develope to his honor the Governor General in Council, my views on the subject.

5. It is my opinion that under the present circumstances of India, the armies can be considered but as one, they are formed, clothed, equipt, and armed on the same principle in all respects.

6. This perfect similarity should be carried through every branch of the service, and in none more carefully than in the Field Artillery and ordnance generally, whether for field or siege; and in the stores and equipments for the same.

7. With a view to such a result, I am of opinion that means ought to be taken, for deciding permanently, certain preliminary points, for example,

What is the best gun of every description and calibre for field service in India ?

What is the best construction for carriages ?

What is the best for wheels ?

What is the best mode of draught ?

What is the best mode of conveying spare ammunition ?

Determine all these points as to field batteries, horse and foot, park for sieges, and all other ordnance ; make similar decisions as to the harness, equipments, driving, and details of all kinds, as far as differences of local circumstances may permit.

8. A general uniformity in all these matters, would render more simple, and facilitate all supplies from Europe, and the general provision of stores in magazines ; and I have no doubt would eventually prove a very great saving to the East India Company ; and would in the case of war, be of the greatest practicable advantage by rendering all stores supplied to the forces of one Presidency, equally applicable to the purposes of either of the others.

9. But now come to the question, how is this to be effected ? and why has a measure which seems so desirable in itself, been so long under consideration without any progress having been made towards a settlement ?

10. The last question I will reply to first ; I deem the Military Boards of Bengal and Madras (judging from their practical operations and indeed from their construction) are not bodies likely to come to conclusions on the points antecedently referred to ; they may possess all the requisite knowledge, they may discuss points with great ability, but they will not come to feasible decisions, and that the two boards could be brought to an agreement on many very important subjects, I very much doubt.

11. The only consequence then of such discussions are references ! to whom do you refer ? are the Military Councellors of the Honorable Court of Directors competent Judges ? I think not.

To whom would they refer ?

To the highest authorities of the British artillery.

Are they competent Judges?

No soldier has a higher opinion of the professional knowledge, of the judgment, of the skill, and the discretion of the higher authorities of the British Artillery, than I have. On subjects on which they have had practical experience, I need seek no further for advice; being sure, that I would receive from them the best that Europe affords: but they know nothing of service in India, they do not know the country, they do not know the practical effect of the absence of roads, they do not know the composition of the forces, with whom only within the Peninsula, your Artillery can have to contend in the field; and as they know nothing of hill forts, or of the means of approaching them, or what is best calculated under all circumstances to afford the means for their reduction, I say, on these grounds, that the authorities of the British artillery are not competent Judges; and therefore I think that the adoption of the details for a field battery, as for the construction of a gun or carriage, or for any detail for the service in India under their exclusive opinion, is not in accordance with the dictates of wisdom.

12. I think the only mode of bringing the question debated to a practical, final, and sensible result, will be to establish a committee, to be composed of officers of the Artillery of the presidencies of Bengal, Madras and Bombay. The officers to be selected by the Commander-in-Chief of each presidency. To order them to assemble at Calcutta, bringing with them models of their respective ordnance, and whatever else may be deemed necessary. To sit under the presidency of such officer as the Government may deem the most desirable, and to have orders to come to a positive decision on the various points to be submitted to their consideration.

13. This is an outline of my views. If the Government are pleased to take the subjects decided upon, into their serious consideration, with a decided view to practical results, I shall be quite ready to lend any aid in my power towards accomplishing the end; and shall be willing to afford such further advice, as I may be considered competent in giving.

14. That a reform in the ordnance department, with a view to useful uniformity in all its branches in each of the presidencies, and with the object of reducing their means to a well considered end, will produce a very considerable even-

tual saving to the Honorable Company I have no doubt whatever.

15. I do not imagine that the cost of such a committee as I have suggested need amount to much ; because if the officers received their pay and allowances, while on duty at Calcutta, and the cost of their journey to and from Calcutta, paid, and house rent allowed to them, nothing more could be necessary ; and I think that the settling of the business contemplated by the practical men proposed to be called together under a proper president ; could not require any material lapse of time.

(Signed) H. Fane, *General.*

(A true copy.)

(Signed) Wm. Casement, *Colonel,*

Secretary to the Government of India,

Military Department.

Minute of the Commander in Chief, dated 1*st February* 1836.

In furtherance of my views developed in my minute of the 15th January 1836, and approved of by His Honor the Governor General in Council, as communicated in the minutes from the Military Department, dated 18th ultimo, I beg to suggest as follows :

1st.—That the purport of the two minutes above mentioned, shall be sent to the Governments of Madras and Bombay, and that the Government of each presidency may be solicited to communicate the same to their respective Commanders in Chief, and to call upon them to select such two Officers of the corps of Artillery of their respective Presidencies, as they may consider the most competent judges of the several points alluded to in my minute of the 15th January, and who they deem the most fit to decide finally upon the various important points to be submitted for their consideration and judgment.

2d. –I think the best selection will be, one Officer who has had practical experience in the field in past wars, and is consequently conversant with the difficulties, which Artillery in India has to contend with ; and the other, the most intelligent officer with reference to the construction of carriages and the mechanical branches of the Artillery service.

3d.—I advise that they may be directed to bring with them respectively, patterns of their most approved guns, and of their equipments, both Horse and Foot Artillery; wheels, and patterns of any alterations, or improvements, they may be desirous of recommending.

4th.—The motives for the assembly of the Committee in Calcutta, should be clearly explained to them; and they should understand that they are not only authorized, but ordered to bring with them whatever they may consider necessary to the elucidation of the subjects to be debated and settled.

5th.—It will be very desirable that officers may be selected for this duty, who are not on staff employ, if such selection can be made without detriment to the important objects in view. If however, it appears desirable to send an officer who is on staff employ, the respective Governments should be requested to arrange that such officer may not vacate his staff employment by his temporary absence on duty from the presidency, and that his emoluments while employed on the business contemplated, may remain the same as he was in the enjoyment of, at the time of his selection.

It is desirable that the Committee shall be assembled as soon as practicable, and that a day should be named for their being in Calcutta.

6th.—As the determination of what shall be deemed a proper proportion of reserve Artillery, and also of what is the requisite battering train, and engineer's equipments, to be kept in store at each presidency, form material points of my consideration, I should desire that the respective Commanders in Chief, may be directed to call upon those Engineer officers under their orders, who have had the most practical experience in Indian warfare, to give their opinion on paper, as to the articles they have found the best suited to the general operation of sieges in India; making it their object to combine the most effective ordnance with sufficient facility of being moved into such positions as the attack of the strongest Hill Forts in the country may require.

7th.—The gun which would be most effective may not be capable of being got into position with our means; the gun very easily moveable, may not be effective; the opinion therefore wanted, is, what calibre will best combine the two qualities desired; viz. capability of being moved and made useful, with power sufficient to perform the work ordinarily required.

8th.—As our officers are well acquainted with the composition and construction of most of the strong Forts in the Peninsula of India, there can be no difficulty in giving decided opinions on these points, and I recommend that such opinions be obtained and brought from Madras and Bombay by the Artillery officers who may be sent from each presidency; the same to be accompanied by such suggestions, or observations from the respective Commanders in Chief as they may be pleased to offer.

(Signed) H. Fane, General.
(A True Copy.)
(Signed) Wm. Casement, Colonel,
Sec. to the Government of India,
Military Department.

Fort William, 9*th July* 1836.

Proceedings of a Special Board of Artillery Officers assembled in Fort William, under instructions from the Secretary to the Government of India, Military Department, dated 30th May 1836; for the purpose of taking into consideration, and suggesting arrangements for the introduction of uniformity as far as may be compatible with local peculiarities of each establishment, in the materiel and equipments of the Artillery branch of the service, at the several presidencies of Bengal, Madras and Bombay.

President.

W S Colonel Whish	Bengal Artillery.

Members.

J Lieut.-Colonel Stevenson	Bombay Artillery.
Major J Tennant	Bengal Artillery.
G Major Conran	Madras Artillery.
RS Captain Seton	Madras Artillery.
WT Captain Whitlie	Bombay Artillery.

SECRETARY.

Captain Cartwright..................Bengal Artillery.

Having read the instructions contained in letters Nos. 410 and 411 of 30th May 1836, from Colonel Casement, Secretary to the Government of India, Military Department; together with letters dated 16th December 1828, and No. 18 of 1834,* from the Honorable the Court of Directors, that from Sir Alexander Dickson of the Royal Artillery, dated 8th of April 1834,* and the minutes of His Excellency the Commander in Chief of India, dated the 15th January and 1st February 1836, as alluded to in the Military Secretary's communication, the Board proceed to investigate the different subjects to which their attention is called, in the following order.

1st.—The organization and equipment of troops of Horse Artillery.

2d.—The organization and equipment of Field Batteries.

3d.—The organization and equipment of Siege Trains.

HORSE ARTILLERY.

The various points for consideration in the formation of a troop of Horse Artillery, may be classed under the following heads, viz.

Ordnance.	
Ordnance Carriages . .	Including ammunition waggons, spare carriages, forge and store carts.
Ammunition.	With reference to charge, quantity and proportion of each nature, as also stowage.
Implements and small Stores.	
Harness.	
Organization including Cattle.	As to draught, and conveyance of Gunners.
Artillerymen	As to number and proportion of each rank.

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* Vide Appendix E.

Establishment........	Including Horse attendants, Drivers for ordnance carriages extra to the established number of Artillery men, Smiths and Carpenters, and Quarter Master's establishment.

And in reference to these points, the Board record their opinion as follows:

Ordnance.—That 6 pounder guns in length 5 feet, weighing 6 cwt; and 12 pounder howitzers, in length 3 feet 9·2 inches, weighing 6½ cwt. (being those now in use) are best adapted to the Horse Artillery service in India.

N. B.—The Board recommend both being cast with elevating screw loops.[*]

Proportion of each Nature.—That a troop consist of 5 six pounders, and 1 twelve pounder howitzer.

Charge.—For the 6 pounder to be 1lb. 8 oz. and for the 12 pounder howitzer 1lb. 4 oz.

N. B.—Major Tennant differing in opinion with the other members, as to the calibre of the ordnance with which troops of Horse Artillery should be armed, submits a minute marked A in appendix.

The following number and description of carriages are required for each troop.

6 pounder gun carriages	5
do do. do. spare	1
12 do. howitzer carriage	1
Waggons ammunition.. 6 pounder	5
do. do.......12 do.. howitzer...	1
do. do........ spare	1
Cart Store	1
do. Forge	1
Total	16

Gun and Howitzer Carriages.—That the cheek pattern with contracted trail, as in use at Madras and Bombay, is preferable to the beam trail. The Board decides in favor of the former, though it considers the Bombay carriage in every respect efficient.

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[*] It was subsequently decided that the ordnance should be cast without loops.

With reference to the several parts of these carriages, the Board would recommend that,

The Limbering Loop.—Be of the swivel pattern, with elliptic eye.

The garnish plates to have four bolts passing through the cheeks, and to be of the same pattern as at Madras.

The Iron Axle Tree.—To be the same as that used in the Madras carriage, that is, without perforations, bedded in wood and attached to the carriage by iron bands.

The Wheels.—To be of the Madras pattern, having metal naves and iron washers.

N. B.—The committee decide in favor of metal naves, but in reference to their being a large supply of pig iron at the Bombay presidency, and their having the means of casting it at the gun carriage department, they see no objection to the iron nave (which for many years has been found serviceable there) being continued, provided the pattern now prescribed be attended to.

Seats.—On the gun axle tree as now in use, to be omitted.

Locking Chain.—Is at present attached to the Bengal carriages, but considered unnecessary.

Match Box.—To be small, and attached to the near cheek as in the Madras carriage.

Traversing Handspike.—To be of iron and to fold over.

Elevating Screw.—Of the 6 pounder to be fixed to the cascable of the piece;* that of the howitzer to be loose, with a flat or capstan head; the screws to work in a wooden transom according to the plan adopted at Bombay.

Portfire Clippers.—As at Madras, attached to the outer side of the off cheek.†

GUN CARRIAGE LIMBER.—To carry two ammunition boxes as is now the practice in Bengal and Bombay, the dimensions to be hereafter stated.

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* It was subsequently decided that the screws should not be fixed to the piece.

† The pattern carriage received from Calcutta, has the clipper *inside* the near cheek.

Pole.—To be under the splinter Bar and moveable.

The Gun and Waggon Limbers to be constructed so as to admit of moveable shafts or pole. The Board have already decided on the latter, but on the representation of the Bombay members, admit that it might be convenient to use shafts on particular occasions, and can see no objections to construct the carriages so as to admit of either, which may be done without interfering with their uniformity. The harness too of the off wheel Horse, may be adapted to shaft draught without much trouble, and at little expence when necessary, with nothing but a trifling addition to that used with the Poles ; under these circumstances the Board do not object to the proposal of the Bombay members to retain shafts for that Presidency.

Wheels.—To be of the Madras pattern and exactly similar to the Gun Carriage Wheels.

Axle Tree.—To be of the Madras pattern and exactly similar to the Gun Carriage Axletree.

Limbering Hook.—To be fixed to the rear of the Axle-Tree Bed, agreeable to the mode adopted in Bengal and Bombay.

Pole or Collar Bar.—To be of iron 3½ feet in length ; to be used fixed below the pole, and attached to it as in the Bengal, but to be furnished with shoulders as the Madras pattern ; the Hook of the linking Chain to be the same as that attached to the Madras Harness.

Store Box.—One to be on each Limber, and all to be of one size and shape.

Ammunition Waggon.—The Limber to be precisely the same in all respects as that attached to the Gun Carriage.

Body of the Waggon.—To have four ammunition Boxes of the same dimensions in all respects as those attached to the Limber.

Wheels and Axle-tree.—To be precisely the same as those in use with the Gun and Limber Carriage.

Limbering Loop.—To be of the swivel pattern.

Platform.—To be on the skeleton or frame principle.

Perch (Waggon)—To be made moveable so as to allow of a pole being substituted when required as at Bombay, but to be somewhat stronger; the Limbering Loop to be swivel pattern.

SPARE CARRIAGES.—To be attached to each Troop.

Gun Carriage 6 *Pdr.*—To be exactly the same and equipped in the same manner as the other Gun Carriages.

Ammunition Waggon.—To be exactly similar, and to be fitted up in the same manner as the other Ammunition Waggons.

Cart Store.—To be double, with a Limber exactly the same as a Gun Limber, the body to have planked sides, and the top to be closed with a cover sloping from front to rear, 2 or 3 inches from the top of the Cart at the highest part.

Wheels and axletrees to be the same as those with the Gun Limber and axletree.

Platform.—Length 5 feet 6 inches.
Breadth 3 feet
Heigth of sides 2 feet planked

Cart Forge.—To be double, and in all respects the same as the store cart.

AMMUNITION.—QUANTITY AND PROPORTION OF EACH NATURE FOR THE 6 POUNDER.

Each box to carry 20 rounds of ammunition, which with the gun limber and one waggon will give a total of 160 rounds for each gun, to be made up of different descriptions as follows, viz.

Spherical case	16
Common or canister case	24
Round shot	120
Total	160

To be packed in double tiers as follows.

		S. C. S.	Can.S.	R. S.
Gun Limber	Near box	2	4	14
	Off box	2	4	14
Waggon Limber	Near box	2	4	14
	Off box	2	4	14

		S. C. S.	Can.S.	R. S.
Waggon body....	Near fore box..	2	0	18
	Off fore box....	2	0	18
	Near hind box..	2	4	14
	Off hind box....	2	4	14

FOR THE 12 POUNDER HOWITZER.

Each box to carry 12 rounds of ammunition, which with the howitzer limber, and one waggon, will give 96 rounds per piece of different descriptions, to be packed in double tiers as follows.

		S. C. S.	Can.S.	Com. shell.	Car.
Gun limber..	Near box....	4	4	4	0
	Off box.	4	4	4	0
Waggon limber.	Near box....	4	4	4	0
	Off box.	4	4	4	0
Waggon body..	Near fore box	4	0	4	4
	Off fore box..	4	4	4	0
	Near hind box	4	4	4	0
	Off hind box..	4	4	4	0
	Total 96 rounds.	32	28	32	4

Cartridges.—Two spare rounds of cartridges above the number of rounds of shot or shells to be carried in each ammunition box packed in a seperate box of copper after the principle adopted at Madras.

IMPLEMENTS AND SMALL STORES.—The following abstract will shew the number of guns and carriages of all descriptions, together with the quantity of ammunition, implements and stores attached to Horse Artillery field battery.

Names of Stores, &c.	For 5, 6 pdr. guns, and 5 waggons.	For 1, 12 pdr. howitzer, and 1 waggon.	For Battery or spare.
Anvils smith's Europe	0	0	1
Aprons gun and howitzer.	5	1	0
Augers fuze hand	10	2	0
do. do. brace or breast	5	1	0
Axes felling	5	1	0
do. pick	10	2	0
Axletrees iron	0	0	1
Bags canvas fuze for gun and howitzer..	10	2	0
do. do. for bursting powder cartridges	10	2	0
do. cartridges empty	80	16	0
Bars pole or collar iron, one to a carriage.	0	0	3
Bellows small Europe	0	0	1
do. country pairs..	0	0	2
Bitts gimblet	5	1	0
do. gun or vent	10	2	0
Bill hooks	10	2	0
Bottles copper with spirits of wine	5	1	0
Boxes copper for cartridges	40	8	0
do. ammunition attached to carriages..	40	8	0
do. store do. do	10	2	0
do. quick match with 1 skein	5	1	0
do. match	5	1	0
Buckets water wood	10	2	0
Caps canvas for spunge heads	15	3	0
Carriages ammunition	5	1	1
do. gun and howitzer	5	1	1
Cart forge with limber	0	0	1
do. store	0	0	1
Cartridges serge for charge and spare (2 spare in each box)	880	112	0
do. do. for priming 2 in each box.	80	16	0
do. do. filled bursting 8oz...	0	32	0
do. do. do. do. 4½oz...	0	32	0
do. do. 2½ or bursting	80	0	0
Chains linking	20	4	4
Compasses common	5	1	0
do. calibre small	0	0	3
Cork screws	10	2	0
Covers canvas painted one to each box..	40	8	0
Crows iron	5	1	0
Drag ropes	20	4	For spare carriages or 8 carts.

NAMES OF STORES, &c.	For 5, 6 pdr. guns, and 5 waggons.	For 1, 12 pdr. howitzer, and 1 waggon.	For Battery or spare.
Drifts gun or vent	10	2	0
Esses Iron	10	2	0
Felloes	10	2	0
Files hand or tennon saw	0	0	1
Funnels copper	0	0	3
Fuzes graduated spherical case 4 to each.	320	256	0
Gimblets	5	1	0
Glasses spying	0	0	2
Hammers claw	10	2	0
do. wrench	10	2	0
Handspikes common	10	2	With spare waggon. 2
do. trail or traversing attached to carriage	5	1	With spare carriage. 1
Hatchets hand	10	2	0
Haversack gun ammunition	10	2	0
Hooks limbering	0	0	1
Kegs grease	5	1	0
Knives Laboratory	5	1	0
do. clasp English	10	2	0
Line seizing skeins	40	8	0
Loop beam trail	0	0	1
Mallets fuze with setters	10	2	0
Mamooties	10	2	0
Match slow gun cotton skeins	40	8	0
Oakum	as required.		
Ordnance brass field light	5	1	0
Padlocks brass small	50	10	0
Pawlins wax	0	0	2
Pincers fuze	10	2	0
do. gun	10	2	0
Pins linch	0	0	16
do. pole	0	0	16
do. swivel yoke pole or collar bar	0	0	16
Poles or shafts	0	0	3
Portfires	200	24	0
Pouches priming	10	2	0
Quadrant	0	0	1
Rasps fuze	10	2	0

Names of Stores, &c.	For 5, 6 pdr. guns, and 5 waggons.	For 1, 12 pdr. howitzer, and 1 waggon.	For Battery or spare.
Rope Europe 1½ inch fathoms	120	24	0
do. do. 5 do. do.	20	4	0
Saws fuze	10	2	0
Scales Tangent	5	1	0
do. copper with beam 4lb. to ¼oz. weight setts	0	0	1
do. gunter	0	0	5
Scissors	10	2	0
Screws elevating attached to carriages	5	1	0
Setters saw steel	5	1	0
Shells common	0	32	0
Shells ... Shrapnell	80	32	0
Shells ... Carcases	0	4	0
Shot canister grape	120	28	0
do. round	600	0	0
Spokes spare	10	2	0
Spikes gun spring double	10	2	0
do. gun jagged	10	2	0
do. relievers	10	2	0
Spunges (to be of the Bengal pattern)	15	3	0
Straps leather with buckles for securing side arms	as required.		
Sticks portfire	10	2	0
Swingletrees pairs	10	2	2
Swivels collar bar	0	0	2
Twine Europe skeins	10	2	0
Vices fuze block	5	1	0
do. do. hand	5	1	0
Wad hooks	5	1	0
Washers drags	40	8	6
Wax cloth	10	2	0
Wires priming	10	2	6
Wrenches common	5	1	0

N. B.—The above stores are independent of what are carried for the use of Artificers, in quantity and description agreeble to the regulation of the different Presidencies.

HARNESS AND SADDLES.

Harness.—The Madras pattern (brown leather) to be adopted, but the space in the centre of the tree of the off or pad saddle of the carriage teams, to be covered instead of being left open as at present.

Saddle.—To be of the old cavalry pattern, which is that in use at present with the troops of Horse Artillery at all the presidencies.

Valisse.—To be of brown leather and of a cylindrical form, 18 inches long and 6 inches in diameter without any stiffening.

The cloak in marching order to be over the holsters, and the sword slung on the saddle rings.

ORGANIZATION.

The majority of the Board are of opinion, that the detachment system (or that where the Artillery men for working the guns are mounted on horses distinct from those used for the draught of the carriages) is the most efficient; but the Bengal members dissenting from this opinion, and the members from Madras and Bombay not exactly coinciding as to the establishment of draught cattle required to insure efficiency; the Board have determined on submitting the question with their several minutes and suggestions with reference to the establishments required in the formation of troops of Horse Artillery, for the consideration of higher authority.

In the establishment proposed for the three presidencies, the number of men very nearly agree, and might easily be made to correspond; in regard to cattle, the discrepancies are considerably greater and more difficult to be reconciled.

The disagreements appear to consist nearly in this, that the Bengal officers require an extra set of horses for their waggons, to be permanently attached; while the Madras require but one set of horses for the same purpose, with bullocks to be casually furnished on occasions of actual movements; and those from Bombay require for their draught, half a set of horses spare, and to be of course, part of their regular establishment; but if the principles which should guide the Board on these points were decided, the members do not apprehend that there would be any further difficulty, in laying down one uniform establishment.

With reference to these points the following documents are attached.

1st. Minute by Colonel Whish of the Bengal Artillery dated 21st June 1836.

2d. Statement shewing the present strength of a Bengal European Troop of Horse Artillery, with the proposed additions or decrease agreeable to the system at present followed.

3d. Do. Do. of a Native Troop.

4th. Statement shewing the number of men and Horses supposed to be necessary for a Troop of Horse Artillery with reference to the detachment system, as followed at Madras and Bombay.

5th. Minute on these subjects by the Bengal Members.

6th. Proposed Establishment for a European Troop of Horse Artillery on the present Madras system.

7th. Do. Do. Do. for a Native Troop.

8th. Minute on these subjects by the Madras Members.

9th. Proposed establishment for a European Troop of Horse Artillery, agreeable to the Bombay system.

10th. Minute on these subjects by the Bombay Members.

11th. Statement shewing the number, rank, and description of the Brigade staff, at the several Presidencies of Bengal, Madras, and Bombay.

No. 1.

Minute by Colonel Whish, Bengal Artillery, and concurred in by Major Tennant, Bengal Artillery, 21st June 1836.

The majority of the Board having determined in favor of the Detachment system for the Horse Artillery, I deem it indispensably necessary to refer the point for the decision of Government.

In the few observations I have to offer as elucidatory of the principal features of each plan, and of the deductions I make from them, I hope not to be essentially at variance with my Bengal Colleague, who having been Assistant Adjutant General of the Regiment for 12 years, has had good opportunity for noticing the advantages and defects of the organization of our Horse Artillery, and who has continually during that period, to my knowledge, made them matters for his serious consideration, and of reference to Officers of experience, and from whom he must have received from time to time, much practical information.

When the Bengal Horse Artillery was first formed, the only Horses procurable were of violent and uncertain tempers, and very difficult of management, these circumstances led to the Corps being organized on a plan that gave more restraint, viz. the off as well as the near Horses being rode, and the riders of the former dismounting to serve the Gun; which in the Madras and Bombay Horse Artillery (where the near Gun Horses only are rode) is effected by half the riders of a separate detachment of (10) ten, dismounting, aided by two Gunners on the Limber, which latter arrangement is equally practicable with us, and it will accordingly in what follows be substituted for the two Gun Lascars we carry on the Gun axle (seats).

Now let us suppose a Troop of Horse Artillery on each of the above systems, coming into action, the waggons of both being at a small distance and out of harms way.

By the Detachment system.

Each Gun has 6 Horses in draught (none spare) and 3 men
The Detachment 10 Horses and ....10 ,,
On its Limber .... 2 ,,

Total 16 Horses and 15 men exposed for the purpose of furnishing 7 or 8 men to work the Gun.

By the Bengal system.

Each Gun has 7 Horses and 7 men including the non-commissioned officer.

On the Limber.............................. 2 Men.

Spare accompanying and in action, one rider dismounting..........} 2 Horses.. 2 ,,

Total 9 Horses and 11 Men giving the same working detail of 7 or 8 men!

In Bengal, the near centre rider of the Gun dismounts, and it is of course equally practicable on the detachment system, so that both the above Guns may have 8 men for a Guns crew, but if wisdom consists as much, in not multiplying the means without necessity, as in the choice of the best means to arrive at the best end, I think we cannot act consistently with it by recommending the detachment system, which to effect *precisely the same purpose* as that of Bengal, brings before the enemy the very great *additional* number of 4 men and 7 Horses per Gun, (or of 24 men and 42 Horses per Troop) a detail that would almost man and completely horse the Guns of another half Troop, and to ensure *efficiency* on this plan much extra expence *must* be incurred.

When I commenced enquiry and comparison of these two systems, I was rather prepossessed in favor of having detachments, (and knowing as I do, that the disposition of our Horses does not render the other plan imperative) but I have at last come to the conviction, that what was first adopted from necessity should now be continued from choice, and that the Bengal system which has never yet been complained of for inefficiency, should be established for all the Horse Artillery in India.

Signed {W. J. Whish, *Colonel.*
{J. Tennant, *Major.*

Remarks on the above by Sir H. Fane and Colonel Morison.

According to the reasoning in this minute, if it is admitted without controversy, the advantage of the Bengal system is so striking, on the score of economy as well as diminished exposure of men and Horses, that it would be most strange that the Bengal Artillery should be the only Corps of Horse Artillery either in India or Europe so organized!

But in fact there are several important points for consideration, on which Colonel Whish has not touched.

The most important is *efficiency when called into action.* Economy must be made a secondary consideration, for, when a Government deems it expedient to equip so costly an arm as Horse Artillery, they must not swallow a Camel and strain at a Gnat!!!

Let us then consider, what a soldier must deem the main point "efficiency when brought into action."

All experienced officers know that it rarely happens that assailants (which I hope our Horse Artillery will always be!) bring their Troops *fresh* into action. Affairs are generally brought on after a long or rapid march. It is at the end of such, that the active exertions of Horse Artillery are required. Let us then suppose six Horses in a 6 pounder, each with a weight of fifteen or sixteen stone on his back, and having drawn the Gun over ten miles of bad road; take another Gun with riders on the near Horses only, and the off horse free to exert his energies without any pressure on his back or loins; which Gun I ask, will be the most capable of the active exertion I require from it? I cannot doubt the answer.

Let the Guns now unlimber for action. Two Bengal Gunners take to the rear the 6 Horses and the Limber, a casualty happens to one man and thus the six unruly Horses, which are supposed to require six men on their backs to manage them, are to be taken back to the Gun, with its Limber, under fire; and on such an arrangement depends perhaps, your getting off your Gun, and working Gunners!

Practically, I cannot say how the management answers, but theoretically I think it bad.

Your Gunners when mounted as detachments are available as Dragoons to save their Guns on any sudden or unexpected attack; they cover their Gun from individual assault of daring pursuers; whereas a retiring Gun with the Gunners on its draught Horses, is entirely dependent on others for such aid. Moreover, your Gunners mounted as detachments enables you to select your lightest and least efficient Artillerymen as drivers on your Gun Horses, and so to spare the exertions of your best until the critical time at which they are wanted.

These and some other reasons unnecessary to mention; form sufficient grounds in my mind, for preferring the organization in which the Gunners are mounted as detachments.

(Signed) H. F.

I entirely concur with His Excellency the Commander-in-Chief; in every Horse Artillery in Europe and in India (Bengal excepted) the system of detachments is now in use.

(Signed) W. M.

No. 2.

Statement of a Troop of European Bengal Horse Artillery as it is, and as it is proposed to be

Present Establishment.		Addition.	Decrease.	Total now proposed.
Staff Serjeants	1	1	0	2
Serjeants	6	0	0	6
Drill Corporal	0	1	0	1
Corporals	6	0	0	6
Bombardiers	10	2	0	12
Rough riders	2	0	0	2
Farriers	2	0	0	2
Trumpeters (Two half pay Boys in addition).	2	1	0	3
Gunners	80	16	0	96
	109	21	0	130
Non Effective Staff.				
A Pay Serjeant				
A Saddler				
A Camp Colorman when marching				
Gun Lascars.				
Not required in the Guns with the above detail, but would be useful in saving the Europeans from out duty by day &c. &c. &c.				
Havildars	1	0	1	0
Naicks	2	0	2	0
Privates	24	0	24	0
Drivers.				
Drivers for Store Cart	3	0	0	3
Syces and Grass Cutters.				
Syces per Horse	1	0	0	1
Grass Cutters	1	0	0	1
Native Staff.				
Doctor	1	0	0	1
Farrier	1	0	0	1
Train Establishment.		for 3	forg	es
Smiths	7	2	0	9
Carpenters	3	0	0	3
Bildars (when marching)	4	0	0	4
Moochee	1	0	0	1
Bazar and Quarter Master's Establishment as at present sanctioned, and which must depend on local circumstances, and which appears to be efficiently provided for at each Presidency.				

Present Establishment.		Addition.	Decrease.	Total now proposed.
Cattle.				
Horses	169	15	0	184
Bullocks	7	0	0	7
N. B. An additional number being furnished as at present on a march for the Quarter Master's Cart, as also for the spare Waggon.				
Ordnance.				
Six Pounders	4	1	0	5
Howitzers	2	0	1	1
Ammunition Waggons	8	0	2	6
Spare Gun Carriages } To be drawn by Horses	0	1	0	1
Forge Cart } To be drawn by Horses	0	1	0	1
Spare Waggons	0	1	0	1
Store Cart	1	0	0	1
Quarter Master's Cart, and Store Cart when marching	2	0	1	Qr. Mr.'s Cart 1

EXPLANATION.

Increase, 1 Staff Serjeant (a Quarter Master Serjeant as in a Native troop) 1 Drill Corporal instead of the Drill Corporal of brigade N. C. Staff; 2 Bombardiers, 16 Gunners and 15 horses. Our troops of Horse Artillery have always stood in need of a considerable addition in men and horses, but the modification of the ordnance equipment (for horse draft) to 6 guns and 6 waggons, 1 forge cart, and 1 spare gun carriage, prevents the necessity now of a large increase, 5 horses have been allowed to each of the 2 latter carriages; and for the waggon a double set (and one additional) as allowed for the guns.

Thus, 2 Staff Serjeants	2
6 Serjeants	6
1 Drill Corporal	1
2 Rough Riders	2
3 Trumpeters	3
2 Farriers	2
2 Native Doctor and Farrier	2
Horses	18
6 Guns (as present system) at 13 horses each	78

6 Waggons (instead of 8)	at 13	,,	,,..	78
1 Spare Carriage	,, 5	,,	,,..	5
I Forge Cart	,, 5	,,	,,..	5
	Total Horses..........			184

In 1816, on the formation of the Rocket Corps, its cars (of the weight of 6 pounders) had only 5 horses allotted to each. This number was twice increased and ultimately raised to an equality of a Horse Artillery gun, after the force under Sir J. Arnold returned from the Bhattee country in 1818.

In February 1817, the two troops of Horse Artillery that went on service from Meerut, could not have taken the field efficiently, had they not been assisted by the troop that remained in cantonments. During the Campaign of 1817-18, the horses nominally allotted to the spare waggons, were allotted to the 1st line, and the spare waggons drawn by bullocks.

In July 1824, the 1st troop 1st brigade left Meerut for Ava, with only 92 men and 145 horses, 96 were in draft at all times, which with 12 rode with the guns spare, and the 10 Serjeants, Trumpeters, &c., left but 27 horses disengaged. The officer commanding was immediately (in an unknown country) reduced to various shifts and expedients which would probably have been unavailing, but for timely assistance received from the rocket troop.

On the opening however of the second campaign (in Ava) 1st December 1825, the troop could only muster 72 men and 62 horses.

When the 1st troop of Horse Artillery was relieved by the 2d troop at Mhow in December 1821, for want of Europeans to ride the horses, many of its waggons were drawn by bullocks to Meerut.

In this country where we must depend so much upon our own resources, it appears imperatively necessary to have our establishments at all times complete and on a liberal scale.

If the guns are to be worked by detachments, it is imagined that a small addition of European detail would be necessary and about 50 horses.

The gun lascar detail having been dispensed with, (as not on the above plan necessary for the gun equipments) it is proposed that 12 syces per troops (having an extra rupee per month) be selected to clean and look after the guns, &c.;

also that 3 jemadar syces, and 3 chowdry grass-cutters, on 2 rupees extra per month, be allowed on the principle adopted at the other Presidencies.

Table shewing the number of men and horses which on this plan are brought into action, first with one gun without its waggon, and secondly one gun with its waggon.

Bengal Gun in Action.	*Men.*	*Horses.*
1 Staff Serjeant	1	1
Gun in Draft	6	6
On the Limber	2	0
Spare from the spare horses not rode on the march	2	2
Total	11	9

To serve the Gun.

1 Serjeant.
3 Off-Drivers.
2 Limber box.
1 Near Centre Driver.
1 Spare Man.

Total .. 8 Men.

Bengal Gun and Waggon in Action.	*Men*	*Horses.*
1 Serjeant	1	1
Gun in Draft	6	6
Waggon in Draft	6	6
Gun Limber	2	0
Waggon Limber	2	0
Spare as above	2	2
Total	19	15

To serve the Gun.

1 Serjeant
3 Gun Off-Drivers.
3 Waggon Off-Drivers.
2 Gun Limber box.
2 Waggon ,, ,,
1 Gun near Centre Driver.
1 Waggon ,, ,, ,,
1 Spare Man.

14 Men nearly a double set.

Table shewing the number of horses in draft and otherwise employed, with the number spare and available for the relief of the draft horses, with a troop of Bengal Horse Artillery, on a march agreeable to the plan now proposed.

	Men.	*Horses*
6 Guns in Draft	36	36
6 Waggons in Draft	36	36
6 Guns and 6 Waggons, 2 each, on Limber box	24	0
Serjeants	6	6
Trumpeters	3	3
Other Troop Staff	9	9
2 Carts in Draft	4	8
Spare Horses for Guns	6	36
„ „ „ Waggons	6	36
Total	130	170
Spare for accident		14
	130	184

No. 3.

Statement of a troop of Bengal Native Horse Artillery as it is, and as it is proposed to be.

Present Establishment.		Addition.	Decrease.	Total now proposed.
Subadar	1	0	0	1
Jemadar	1	1	0	2
Staff Serjeants	2	0	0	2
Havildars	6	0	0	6
Naicks	6	0	0	6
Bombardiers (are now acting)	0	12	0	12
Rough Riders	2	To be	non ef	fective
Farriers	2	1	0	3
Trumpeters (2 half pay boys allowed to each troop in addition)	2	1	0	3
Privates	90	5	0	95
	112	20	0	130

NON-EFFECTIVE STAFF.

1 Staff Havildar.
1 Pay Havildar, as at present.
1 Drill Naick.
2 Rough Riders, the latter Non-effective.

N. B.—A Jemadar added to correspond with the number in the foot company (of 125) present establishment of Golundauze, and it is proposed that each Bombardier receive an extra 2 rupees per mensum.

GUN LASCARS.

Present Establishment.		Addition.	Decrease.	Total now proposed.
Havildars.	1	0	1	0
Naicks.	2	0	2	0
Privates.	24	0	24	0
Drivers.				
Syces and Grass Cutters.	3	0	0	3
Syces per Horse.	1	0	0	1
Grass Cutters. do.	1	0	0	1
Native Doctor.	1	0	0	1
Train Establishment.			For 3 Forges	
Smiths.	7	2	0	9
Carpenters.	3	0	0	3
Bildars (when marching)	1	3	0	4
Moochie	1	0	0	1

Bazar and Quarter Master's Establishment as at present sanctioned, and which must depend upon local circumstances, and which appears to be efficiently provided for at each Presidency.

Present Establishment.		Addition.	Decrease.	Total now proposed.
Cattle.				
Horses.	169	15	0	184
Bullocks	7	0	0	7
N. B.—Bullocks being provided as at present on a march for the Quarter Master's Cart, as also the spare Waggon.				
Ordnance.				
Six Pounders.	4	1	0	5
Howitzers.	2	0	1	1
Ammunition Waggons.	8	0	2	6
Spare Gun Carriage } with Horses	0	1	0	1
Forge Cart. } with Horses	0	1	0	1
Spare Waggon	0	1	0	1
Store Cart	1	0	0	1
			Qr. Mr. Cart	
Qr. Mr.'s Cart and Store Cart when marching	2	0	1	1

In the Native troop, 18 horses (as in European troops for outriders) one each for 3 Native Officers, 2 Serjeants, 6 Havildars, 3 Farriers, 3 Trumpeters, and 1 Doctor, the other horses are for the same purposes as in an European troop.

Men selected from the senior troopers have acted as Bombardiers for some years past, and the acknowledgment of that rank by Government, with a small additional pay (2 rupees) would be very beneficial.

No. 5.

MINUTE BY THE BENGAL MEMBERS.

The Bengal Members of the Board of Artillery Officers offer the following observations.

Two systems have prevailed in India of equipping a troop of Horse Artillery; one at Madras and Bombay has this similarity to the Royal Artillery, that the guns are driven by part of the men of the troop mounted on the near draft horses only, and the men who serve the guns in action ride separate horses, which are held when they dismount by an equal number also riding with them, both together being called the detachment of the gun. With neither Presidency however do they exactly conform to the plan of the Royal Artillery, nor do they agree with each other. The other in force in Bengal dispenses with the detachments, carrying all the men on the draft horses, all of which are ridden; a system which the Bengal Members prefer, though the majority of the Board are in favor of the former.

The general advantages of the detachment system, are admitted by the Bengal Members as follows,

1st. The men who serve the gun on the detachment system, dismount while the piece is brought into line by the drivers; whereas in the Bengal system the gun must be brought into line first, and then the men to serve it dismount. When the guns are to be unlimbered immediately after the line is formed, hurry and confusion are in some degree, guarded against in the former system, where the formation is as it were, divided into two parts performed at the same time, and of course with greater opportunity of attention. But still with practice, little inconvenience, if any, has been experienced in Bengal from this circumstance, and it is considered an advantage to have the attention directed to the movements of the gun only, instead of the guns and detachments also, as must be in the detachment system.

2d. A troop with detachments, may proceed to positions when the other could not be sent without an escort, as the detachments themselves amounting to 60 or 70 men, separately mounted, may afford considerable protection, for which the Bengal troop must look for from the line. But the Bengal Members do not think it very desirable that artillery men should be accustomed to act otherwise than in their own duties; from which they are liable to be diverted if employed as an escort to their own guns.

3d. In case of a very sudden emergency, such as taking refuge for a time, within a square, the limbers of the detachment troop may be withdrawn with more facility than those of the Bengal troop, which may have occasion when in action to dismount the centre near driver; but this difficulty is not great even in the Bengal troop, and is of rare occurrence it is presumed.

4th. The facility of formation noticed in the first case, causes the detachment troop to look better at inspection and reviews.

It is further contended in favor of the detachment system, that it relieves the off draft horses from carrying riders, in addition to the draft of the gun; which double duty it is supposed by its advocates, that the horses are not equal to. If the Bengal Members could agree to this position, they would be prepared to concede the point at issue; but they think that the experience of 30 years in their Horse Artillery, has proved that with a double set of horses per gun, they are perfectly equal to the draught of the same weight as is allowed in the Royal Artillery, and as is proposed at Madras and Bombay. There never has been any difficulty in Bengal, except in getting on the waggons, which have hitherto been supplied with one set of horses only, though of the same weight as the guns, and this they now propose to remedy, by allowing a double set for them also. The Bengal members observe, that this can be done without increasing the number of horses in a Bengal troop, even to so great a number as is demanded for Madras and Bombay, and they feel assured, that their troop would thereby be equally moveable with them, and equally capable of enduring long marches; for although they grant that their horses carrying a man each, while in draft, may suffer a little more fatigue, they observe that when not in draught a large proportion carry almost nothing.

But the Bengal Members do not stop here, for to their judgment the experience of Europe corresponds with that of Bengal.

For instance, it has been fully proved that a Horse is capable of exerting a moving power of 250 lbs. draft, sometimes indeed even as high as 400 lbs. has been assumed, and some of the best Engineers in England have estimated thus high; but 250 lbs. has been determined to be certainly attainable by average Horses, that is a mixture of strong and weak Horses acting together.

It has further been determined, that a Horse can exert a power of 125 lbs., travelling at the rate of from 3 to 3¼ miles per hour, for 6 hours every day, some say with advantage to his general health, but all allow without the appearance of fatigue.

It has further been determined, that a Carriage on wheels of the usual size, weighing with its load 1,000 lbs., can be moved on a newly gravelled road with a power of 132 lbs., and on a loose sandy road with a power of 192 lbs., the Carriage having Iron axletrees and Metal boxes.

Now, a Bengal Waggon weighs 1872 lbs., and we have fixed for it 120 rounds of 6 pdr. ammunition, which we may say weighs 1000 lbs. more; admit that the Waggon carries 2 men of 14 stone weight or 392 lbs., the whole weight to be drawn will be 3264 lbs.; and the force to be exerted to move it will be on a newly gravelled road 437 lbs., this work can be done therefore, with 3½ say 4 Horses at 3 to 3¼ miles per hour with ease.

In a loose sandy road the force to move the Waggon would be 626½ lbs., and 5 Horses can do this even at 3 miles per hour with ease.

They have not at hand the means of ascertaining the weight to be drawn on the 6 pdr. Gun, but admitting the Carriage and Limber to be about 13 cwt., the load will be at least, not greater than that of the Waggon, even if the 3 off riders are counted

Carriage and Limber 13 cwt. or........	1456 lbs.
Gun....................................	672 ,,
2 Men on Limber....................	392* ,,
3 Off riders..............................	588 ,,
40 Rounds of ammunition.............	320 ,,
	3428 lbs.

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* All agree however, that these men are not to be here on a march.

but they believe that the Carriage and Limber are considerably less.

The Bengal Members have no doubt then, that for road draft their Guns are not over weighted, and for quick movements as it cannot be expected on such roads as they have calculated above, they must suppose better; let us allow it may be as bad as an ordinary bye-road in England, on which the moving power of the 1000 lbs. carriage, is about 95 lbs. or only two-thirds of what it is in new gravel, and the Waggon could then be moved at 3 miles an hour by two Horses, surely then six may give it all the speed required for Horse Artillery Guns on any occasion.

The conclusions the Bengal Members draw from this, are, that a Bengal Troop where only one set of draft Horses are allowed, is, even admitting an inferiority of the animal to an average English Horse, fully equal to the draft on ordinary marches of 12 or 14 miles a day in continual succession, but not to any thing more, as six Horses are nearly required for the worst description of roads. Hence to make extraordinary exertion it must have extra means, or double draft for relief.

They contend therefore, that by relieving them, and only allowing them to draw every alternate day, as is the practice now in the Guns, they may be considered only to work for half the march and then to rest; and consequently on the whole they are not more fatigued on ordinary cases, than those who really work the whole march. and half of which are equally loaded; and this must be the case in the other Troops unless they are relieved by additional Horses or by Bullocks.

And this in fact they find to be the case at Madras, for their colleagues from that Presidency require that on ordinary marching, all their Waggons and spare carts shall be drawn by Bullocks, in order as it appears to the Bengal Members, that the Horses of their Carriages may act the part of a second set for the Guns as is practised in Bengal.

The Bengal Members here find themselves joined by their Bombay colleagues, in protesting against an arrangement which seems to impair the efficiency of the Troop, viewed as a Troop of Horse Artillery. It is admitted on all hands, that the Bullocks cannot in either Presidency keep up with the Guns on a march, and as one object of Horse Artillery, is to accompany Cavalry, which is not unfrequently detached where there are no, or at least but very indifferent roads, the Waggons, must, in such case, either delay the Troop, and consequently the Detachment with which it is serving, or must require a considerable escort for their protection. Even then serious inconvenience may arise in coming up with an enemy, when so large a proportion of the Gun ammunition is not available. but this inconvenience, would be much greater in case of a retreat, when the Waggons, if unable to keep with the Guns, must either be sacrificed, and the Troop rendered nearly useless, or the line must be delayed for their protection. In such cases indeed, the Madras Members suggest that the Horses alone would be used. but even then the Bengal Members are persuaded, that with the single draft set only, they must be speedily knocked up, while the Bengal Troop would retain its efficiency; and if the emergency were of any duration, the Bullocks would probably even when without a draft, be left to the enemy, and the Troop would suffer all the consequences of the most disastrous retreat, for want of the original assistance which they afforded. For these reasons the Bengal Members are of opinion, that Bullocks cannot be admitted into the organization of a Troop of Horse Artillery, for the draft of what may be designated the fighting Carriages; or the six Guns with a Waggon to each; and as the Madras Members are of opinion, that the Troop as proposed by them would not be efficient without them, or Horses instead of them, the Bengal Members, conceive the point to be established, that a double set of Horses are equally necessary at Madras as in Bengal, and consequently that to supply these or even the Bullocks contended for, would increase the expense beyond the Bengal scale, without increasing the efficiency.

Our Bombay Colleagues however, while they join in protesting against the use of Bullocks, argue, that with the same number of Horses within one or two, as are required for Madras; they believe the Troop will be efficient with them. But this arrangement appears to the Bengal Members, only to differ in the process of calculation, and instead of certain Saddle Horses estimated for at Madras, and certain Carriages for which our Madras Colleagues require both Bullocks and Horses, that the latter may under ordinary circumstances be available to the general purposes of relief; the Bombay Members appear to estimate a double set of Horses for the Guns, by allowing half of the fixed draft for spare; but it does not appear that any efficient set of spare Horses is then obtained even for the Guns, for the allowance of half the draft must be diminished by the sick, the lame, and whatever casualties may arise in the Troop. Were it however perfectly effective, the Waggons would still in the opinion of the Bengal Members, be left nearly in the same predicament as their own now are, with which the Horses have never been all ridden, and consequently the efficiency of the Troop would be no better; the Bengal Members cannot therefore adopt this scale of equipment, which is to their judgment inferior to what at present exists in their own Presidency, which has been long objected to, and which it is their object now to improve.

In action, the Bengal Members conceive, the system they advocate to have the following advantages. If they enter a Field of Battle after a march, they relieve the Horses which have been in draft, by those which almost all walked the march without being ridden, and would therefore they conceive, be perfectly fresh for the manœuvres of the day; while with detachments they must fight and march with the same Horses, unless double setts are allowed. But the advantages do not stop here, for as it is usual to leave all the superfluous Carriages and Cattle under cover, when it can be found, and only to expose those indispensably necessary, if a Gun is engaged without its Waggon according to the Bengal system, it only necessarily exposes 9 men and 7 horses, or even if as is usual, 2 men on spare draft Horses accompany it, 11 men and 9 Horses; whereas by the Detachment system, they expose 15 men and 16 horses, and as the casualties may, under similar circumstances, be estimated to arise nearly in proportion to the numbers exposed, they would in a Detachment Troop, be about two to one compared with a Bengal Troop; even if a Gun and Waggon were acting together, a considerable advantage will remain to the Bengal Troop, which would in this case, expose 15 men and 15 Horses per Gun; while the Detachment Troop would expose 19 men and 23 horses, the chance of casualties in the Detachment Troop in this case being greater, in proportion of 4 to 3. The Bengal Members consider that this circumstance, more than counterbalances the admitted advantages of the Detachment system at first detailed.

The Bengal Members would in conclusion wish to record, that the system in force at that Presidency, has been the result of frequent trials, and not of a single experiment. Originally, when the first Troop of Bengal Horse Artillery joined the Army under Lord Lake in 1803, it had only a single set of Horses for its Guns and Waggons, on which system it was found frequently necessary to help them on with Bullocks, as in the plan now proposed at Madras; but this was condemned by Lord Lake, and the then Commandant of Artillery Sir J. Horsford, from the experience of the Mahratta War; and double Horses were allowed towards the end of the War. When the Horse Brigade was first formed in 1809, the number of Horses for the Waggons was reduced, and this was protested against by the late Colonel Pennington, then commanding the Horse Artillery, who only acceded to the Commandant of Artillery's proposal (Sir J. Horsford) on the explanation "that the fear of the whole "plan failing on account of the expense" (which had been strongly objected to by the Auditor General) "deterred him "from proposing Establishments as full as might be deemed "necessary, leaving the remedy to time." The opportunity did not arrive for mending this faulty arrangement until the Pindarrie War in 1817, when Colonel Pennington obtained six Horses in draft for the Waggons, which then only carried 70 rounds of 6 pdr. ammunition, and 40 rounds of 12 pdr. and 5½ inch Howitzer, without a single round in the Limber. This proportion of ammunition was not equal to the proper equipment of a Troop, and was increased with the introduction of the Royal Pattern Carriages to nearly double. Hence the fatigue now experienced with the Waggon Horses, but this being remedied, the cause of complaint will cease.

A Troop as proposed for Bengal will be as follows on either principle.

For Detachments.

	Horses.
Each Gun (as at present not including the Serjeants)..	13
5 more Guns	65
Each Detachment	11
5 more Detachments	55
Each Waggon (instead of 8 as at present)	13
5 more Waggons	65
2 Staff Serjeants, 1 Drill Corporal, 2 Rough Riders, 3 Trumpeters, 2 Farriers, 1 Native Doctor and 1 Native Farrier	12
1 Spare Carriage	5
1 Forge Cart	5
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On the principle at present established.

2 Staff Serjeants, 6 Serjeants, 1 Drill Corporal, 2 Rough Riders, 3 Trumpeters, 2 Farriers, 1 Native Farrier, and 1 Native Doctor	18
6 Guns as at present 13 each	78
6 Waggons 13 instead of 8 each	78
1 Spare Carriage	5
1 Forge Cart	5
	184
Excess of the Detachment	60

For either Troop 130 men are equally required, but it is thought it will not quite suffice for the Detachment Troop.

p 42 It may be as well to add, that in 1831, after having inspected two Brigades of Bengal Horse Artillery, the Governor General (Lord William Bentinck) remarked, that he did not suppose there was an Army in the world that had a finer Corps of Horse Artillery. Lord Combermere also at Bhurtpore, after inspecting six Troops on Parade, acknowledged, that having seen most of the Horse Artillery on the Continent of Europe, he thought nothing could be better than he saw that day; and Lord Dalhousie expressed his sentiments in the same terms, when he inspected the Horse Brigade at Meerut.

(Signed) { W. J. Whish, Colonel.
J. Tennant, Major.

No. 6.

MADRAS.

Proposed Establishment of a Troop of Horse Artillery on the Madras system.

Europeans.

Ordnance Carriages	Riding Horses in draft	Off-Horses in draft.
5—6 pounders	15.	15.
1 do. spare carriage	3.	3.
1—12 pounder howitzer	3.	3.
6 waggons	18.	18.

1	waggon spare	3.	3.
1	forge cart	2.	2.
1	store „	2.	2.
16		46	46

Allotment of Men.

1 Troop Quarter Master (warrant officer).
1 Troop Serjeant Major.
1 Quarter Master Serjeant.
1 Drill Corporal.
2 Rough Riders.
3 Trumpeters.
3 Farriers.
6 Serjeants.
6 Corporals.
12 Bombardiers.
94 Gunners, being 8 per Gun, after deducting 46 Drivers.
1 Assistant Apothecary.

130 Total.

130 Riding Horses to mount the above number of Men.
46 Off Horses.
16 Spare Horses.

192 Total Horses.

130 Riding Saddles being one to each Man to be mounted.
108 Sets of Harness, being one to each Horse in Draft and Spare, and to include half this number of off Saddles.

Artificers.

3 Smiths
3 Carpenters
3 Bellows Boys
3 Hammermen.
1 Armourer.
1 Chuckler.
1 Moochie.

N. B. In Cantonments all the Artificers in excess of one of each description, might be employed in the Arsenal of the station the Troop may be at.

Puckallies.

4 Puckallies
1 Vakeel (or Writer) } attached to the Troop.

Grass-cutters.

1 to each Horse and three Choudries to the Troop.

Horse-keepers.

1 to each Horse in the Field or in marching. In Cantonments 1 to each, Non-Commissioned Officers, Farriers, Trumpeters, spare and off Horses ; and one to every two of the remainder, and 3 Choudries to the Troop on all occasions.

N. B. The above allotment of Horses is made under the understanding, that (as has hitherto been the case at Madras) Bullocks are always to be provided for the draft of the Waggons and Carts in marching, or in the Field : Horses are allotted for them, and are used in the vicinity of an enemy, or on any occasion when it may be deemed necessary ; but in ordinary circumstances they have been available for a relief to those appropriated to the Guns.

This arrangement would secure efficiency to the Troop, (on the Madras Presidency at least) under the most constant and severe marching it can ever be expected to undergo; but without the Bullocks, a considerable increased proportion of spare Horses would be required. The Bullocks do not form part of the Establishment of the Troop, but are given when wanted.

The above Establishment is on the lowest scale compatible with efficiency, and to secure this, it will be indispensable that it should be kept complete.

(Signed) { G. Conran, Major, *Madras Horse Artillery.*
R. S. Seton, Capt. *Madras Horse Artillery.*

Bullocks.

For	6	Waggons Loaded,	at 10....	60	Including spare, and required only when marching.
	1	Spare Waggon	at 7....	7	
	1	Store Cart	at 10....	10	
				77	

A Camp Colourman in the Field.

No. 7.

MADRAS.

Proposed Establishment for a Troop of Horse Artillery on the Madras system.

Native.

Ordnance Carriages	Riding Horses in draft	Off-Horses in draft.
5—6 pounders	15	15
1 do. spare carriage	3	3
1—12 pdr. howitzer	3	3
6 Waggons	18	18
1 Spare Waggon	3	3
1 Forge Cart	2	2
1 Store Cart	2	2
16	46	46

Allotment of Men.

1	Troop Quarter Master (warrant officer).
1	Troop Serjeant Major.
1	Troop Quarter Master Serjeant.
1	Subadar.
2	Jemadars.
1	Drill Havildar.
1	Drill Naick.
2	Rough Riders.
3	Serjeants (Europeans).
3	Trumpeters.
3	Farriers.
6	Havildars.
6	Naicks.
94	Privates.
1	Assistant Apothecary.
126	Total.

126	Riding Horses to mount the above number of Men.
46	Off Horses.
16	Spare Horses.
188	Total Horses.

126 Riding Saddles being one to each Man to be mounted.
108 Setts of Harness, being one to each Horse in Draft and Spare, and to include half this number of Off or Pad Saddles.

Artificers.

3	Smiths	In Cantonments all the Artificers in excess of one of each description, may be employed at the Arsenal at the Station the Troop may be at
3	Carpenters	
3	Bellows Boys	
3	Hammermen	
1	Armourer	
1	Chuckler	
1	Moochie	

Puckallies.

4 Puckallies.

Attached to the Troop.

1 Vakeel.
5 Recruit Boys.
3 Pension Boys.
2 Regimental Lascars.
1 Totee or Sweeper.

Grass-cutters.

1 to each Horse.

Horse-keepers.

1 to each Horse in the Field or in marching. In Cantonments one to each, Commissioned Officers, and Non-Commissioned Officers; Farriers, Trumpeters, Spare and Off Horses, and one to every two of the remainder.

N. B.—Same as to European Troop.

(Signed) G. Conran, Major, Madras Horse Artillery.
R. S. Seton, Capt. Madras Horse Artillery.

No. 8.

MINUTE.

In discussing the different systems of Horse Artillery in India, with a view to adopting that one which seems the most eligible, we are of opinion, that the main or rather almost the sole consideration to be kept in view, is that of efficiency, because in our judgment, there is no point short of perfection in that respect, at which we might venture to stop; without incurring a risk not only of sacrificing all the outlay of an inferior establishment, but of transforming into a cumbersome appendage of the Army, one of its most essential arms.

Horse Artillery in whatever way equipped, must involve the State in a heavy expense, and the difference in that respect between the most and least efficient Establishments, will always be but trifling, when compared with the whole outlay in either case.

It is on this principle that we would bring the systems under comparison.

The Bengal system (without Detachments) is confessedly one adopted on necessity, and not on the grounds of its possessing any intrinsic advantages, or of having any principles of perfectibility peculiar to it; it was resorted to in fact, on account of the vicious dispositions of the Horses procurable at the time, a circumstance which left no choice open to the Officer who originally organized the Corps, even had a more perfect one been suggested; we are decidedly of opinion that viewed without reference to such a consideration it is exceedingly faulty. The powers of the Horses appear far too highly taxed. With their harness and every thing requisite to be carried in marching order, when merely mounted, they are laden to an extent greatly exceeding that of any Horse in any other branch of the Army, and under these circumstances it is hard to suppose they should be able to cope with them in cases requiring extraordinary exertion, when the whole weight of Gun and Limber laden with men and ammunition &c., is superadded. We feel convinced that the Madras Horse Artillery similarly horsed, would never have made the great and continued exertions it did during the last Mahratta War, as well as on many former occasions; as an argument in favor of the system it is often asserted, that a Horse pulls better from having a load placed on his back, it is true that at a dead pull, a weight so placed and thereby increasing his momentum, might enable him to accomplish what, under other circumstances, he might have failed in doing; but that the addition of sixteen stone weight or thereabouts, would make him more efficient for draft at the rate and continuance expected of Horse Artillery, is a point which we think hardly requires refutation. Stress is also laid on the circumstances of the system requiring (or rather we should say admitting of) fewer men being brought into action, than is necessary in the Madras one, and thereby decreasing the chances of casualties; but that argument in its favor, we consider to carry any thing with it but cogency, for if efficiency requires that a few more men should come into action, or that they can be used there with good effect, we think that in such a case they could not be better or more appropriately disposed of. On the most marked peculiarity, that indeed which characterizes the system, we would moreover observe that we think it impossible, with a man mounted on the off Horse, that the Guns and Carriages can ever be driven with the same steadiness and precision, as when the pair are under the control and guidance of one individual.

With regard to the Madras Horse Artillery in its organization, there were no difficulties to contend with of the description above referred to, and in consequence the system (having Detachments) adopted there, had preference given to it on the ground solely of its own intrinsic superiority; it was then, and still is essentially the system of the Royal Horse Artillery; and though of late years every thing relative to their Field Batteries, has been most amply discussed, with reference to the most rigid economy justifiable, or consistent with efficiency; it does not appear that any alteration of system was ever in contemplation. The advantages of the Madras system over that of Bengal, are generally comprized in its freedom from the imperfections just pointed out, as existing in that of the latter, without any material advantages countervailing. It has some additional and peculiar advantages too, which though incidental and perhaps of secondary importance, should not be overlooked. It possesses to a considerable extent, the means of self protection. A Madras Battery of 6 Guns has always 60 men in its Detachments available for its own defence; whilst one on the Bengal plan would be almost helpless and incapable of affording itself protection in the event of an attack from the smallest and most contemptible body of Troops. Another advantage which the system has over the Bengal one, is this, that when a Gun gets into any difficulty or when any obstacles of an extraordinary nature have to be encountered, the Detachments are always ready to dismount and become available either to aid or extricate it.

Organized as the Madras Horse Artillery now is, and with the Establishment now proposed, we would assert on our experience, that with Horses of the description now in use with it, it would be capable of accompanying any regular Cavalry in the Country at any rate and for any continuance.

We have recommended a continuance of the use of Bullocks with a Troop whilst it is actually moving, not merely from a knowledge of the plan being well calculated to ensure efficiency, but from a conviction that without such a combination in the system, of Bullocks or Camels, or of both, whilst on Field Service, no Troop of Horse Artillery could maintain its efficiency during any protracted Campaign, or series of Campaigns; even if horsed to an extent far beyond what Government could reasonably be expected to sanction.

In the mode here prescribed too, as the Bullocks will only be given on *occasions of actual* movements, the expense will be but temporary as well as trifling.

In forming a general estimate of the two systems in respect of efficiency, we would say that, that of Bengal had inherent and radical defects not capable of remedy or removal, through the means of any outlay on the part of Government, or of zeal and exertion on the part of its Officers; whilst we consider that of Madras to admit of much more perfection, the degree of perfection being mainly dependant on the sufficiency, as well as the judicious application of its Establishment.

If but little advertence has been had to the question of relative expence in this discussion, it has not been by any means from a wish to evade it, or from our labouring under any impression of its being altogether unimportant; but from a conviction of its being but secondary, and from an assurance besides, that notwithstanding what may be alleged to the contrary, when all things are duly estimated, the plan of organization we are advocating, will not be found objectionable on that score.

In fixing the Establishment we have proposed, economy has been consulted to every practicable extent, but if after all, they should be considered too expensive, we would at once suggest, that a sacrifice of Guns be made, if an Establishment in all respects adequate to meet every contingency of service, that can be foreseen, cannot be supported for 6 guns per Troop, then we think there should be but four, and if that number be too great, that it should be reduced to two, retaining these however on a sufficient Establishment; on the system best calculated to ensure the highest degree of efficiency.

(Signed) {G. Conran, Major, Madras Horse Artillery.
R. S. Seton, Capt. Madras Horse Artillery.

The late Commander-in-Chief in India (Lord William Bentick) during his short stay at Bangalore in October 1834, minutely inspected my Troop, which was then the only one stationed there, and gave a most decided and unreserved opinion, as to the superiority of our system over that of Bengal.

During the inspection, he repeatedly and publicly asserted, that he considered it very superior to any thing of the kind he had seen in India.

His Lordship at that time, had had ample means from personal observation of drawing a comparison.

(Signed) R. S. Seton, Captain,
Madras Horse Artillery.

No. 9.

Estimate of Men and Horses as proposed by the Bombay Members for a Troop of Horse Artillery.

	Staff Serjeants.	Farriers.	Trumpeters.	Serjeants.	Corporals.	Bombardiers.	Gunners.	Total of Men.	Horses.	Muckadums and Horse-keepers.	Horse-keepers or Syces.
Details........	2	2	3	6	6	12	105	136	193	4	116

of which 1 Pay Serjeant, 1 Saddler Serjeant, 1 Drill Corporal, and 2 Rough Riders, to be non-effective.

A Statement of Men and Horses.

	Men.	Horses.
6 Guns require	18	36
6 Waggons do.	18	36
1 Forge do.	2	4
Spare ½ the number in Draft	19	38
2 Staff Serjeants	2	2
3 Trumpeters	3	3
2 Farriers	2	2
6 Detachments	72	72
Total	136	193

Distribution of Detachments in a complete Troop without sick.

No. 1	Spunges.		
„ 2	Loads.		
„ 3	Serves the Vent	No. 9	holds his Horse.
„ 4	Fires	„ 10	do. do.
„ 5	Sen. N. C. Officer Comds.	„ 8	Jun. N.C.O. do. do.
„ 6	Supplies Ammunition.	„ 11	holds his Horse.
„ 7	Attends the Limber.	„ 12	do. do.

Horse Holders are available to replace casualties amongst the working numbers.

Bullocks will be required for the Store Carriage, and when actually taking the Field for the Spare Carriage, and the Spare Waggon also; to be furnished in such proportion as will enable the Carriages to keep well up with the Troop.

With the above establishment it is proposed to abolish the Gun Lascars attached to each Troop, so that there will be an addition of 25 Europeans, but a deduction of the same number of Gun Lascars.

Artificers.

1 Nalbund or Native Farrier.
1 Maistry Carpenter.
2 Carpenters.
1 Maistry Smith.
2 Smiths.
2 Armourers.

2 Hammermen.
2 Bellows boys.
1 Chickledar.
1 Moochie.

The Quarter Master's Establishment of Bheesties, Sweepers, &c. being dependent on the regulations of the respective Governments is not noticed.

(Signed) J. Stevenson, Lieut. Col.

MINUTE OF THE BOMBAY MEMBERS.

25th June 1836.

The principles upon which a Troop of Horse Artillery should be based for efficient service, throughout India, being now under discussion; in consequence of the dissent of the Bengal Members, I am urged by a sense of duty to record such observations as have occurred on a careful consideration of the subject; and with every feeling of respect for the experience, and the talents of the Officers, who are of opposite opinions, I feel bound to notice what appear defects in the system of organization proposed by my colleagues, and to develope the principles upon which the Bombay Horse Artillery was originally formed and at present exists.

The most prominent defect is that of off Horses being mounted, thus carrying an extra weight of 16 stone at least, additional to the proportion each is required to draw, being upwards of 5 cwt., and as 5 cwt. is considered generally to be the greatest that should be apportioned to each Horse of 6 in draft, the Horses according to this system must be far over weighted; as overweighting is an objection admitted with the superior Horses obtainable in England, how much more forcibly must it apply to those furnished in this Country, and as regards the Bombay remounts, it is unhesitatingly affirmed, that their powers are unequal to such an exertion.

The inconvenience of the great weight of Carriages and equipments in this Country, have constantly stimulated the desire of our Officers to effect a reduction in them, and now that this object has been successfully attained, to increase the weight by the addition of Off-riders, would be to perpetuate the evil in another form. Following this system, would be adhering to one which suggested itself in the earlier introduction of Horse Artillery, and however well adapted it may have been found for the times, and to meet the services then required of it, and however expedient it may be deemed to continue such an organization for the Bengal Presidency, in consequence of the violent and vicious description of Horses which originated this measure; it is earnestly hoped, that we may rather look forward to the removal of the causes that have operated to prevent their assimilation with every other body of British Horse Artillery, than, that their system should be prescribed for the Horse Artillery of the Madras and Bombay Presidencies.

A further disadvantage is entailed in this organization; in single driving it is impossible that both Horses can be put up to simultaneous draft, being under separate riders. The same objection applies to correct driving, and in a difficult country, intersected by Rivers, and Nullahs, with rocky beds, and steep banks, as well as mountain passes, the want of *unity* of *intention*, and *purpose*, which cannot be calculated on, in two drivers, might lead to the overthrow of the Gun and the destruction of the men and Horses attached to it.

The Bombay system may be briefly described to consist, in the Gunners for the service of the Gun being mounted on separate Horses, and every pair of Horses in draft being controlled and directed by one driver. It has been found fully efficient in every variety of country, embracing sandy and level plains, as well as mountainous tracts; in thus mounting the Gunners they are prepared for the active service of the Gun, and at all times available by a portion dismounting to render assistance in getting the Gun over difficulties, combining the efforts of the whole if necessary to overcome a more serious obstacle. The Detachments when mounted can likewise be made available in aiding the draft of the Gun in any extraordinary exertion. The off horses admit also of being exchanged with the near, and thereby giving a relief. The near draft Horses only having a driver, no impediments are opposed to the power of movement, and capability of bringing the Gun rapidly into action, at any point where wanted without confusion or accident.

One of the principal characteristics of the Bombay Horse Artillery, consists in its *reliance upon its European Artillerymen alone,* in all cases of emergency; and from this organization, its movements on any sudden call of limited service, can be effected for a time, without being dependant on its Lascars or Syces; as spare Draft Horses are in charge of European drivers, and the Europeans invariably groom their own Horses. Nor is any admixture of Lascars or Syces with the European Artillery Men ever permitted in the service of the Gun. In the Bengal Horse Artillery, *four Natives* were observed to be carried with *each Gun* to assist in its duties.

An objection has been urged, that the Detachment system exposes more men and Horses to the Enemy's fire in action, than the Bengal mode, but this is more imaginary than real. Led Horses, and men not actually required to work the Gun, can always be removed from exposure in like manner, as the Waggons, spare Horses, and Men, on the Bengal system.

In the event of Troops under both systems being exposed in a body to the Enemy's fire, it is probable that as the numbers of Men and Horses in each are about equal, that the casualties would be about equal also, but it is imagined that less confusion would ensue, by the more even distribution of Men and Horses in the Detachment, than in the Bengal system, in which so large a body of led Horses are intrusted to the charge of Natives.

The mode of organization in existence at Bombay, is the same as it has always been, and corresponds in principle, with that in England; the efficiency of which has never been doubted. It has been a source of pride and gratification to the Bombay Horse Artillery, to have elicited the unqualified approbation of every General Officer on the staff of that Presidency, since its first formation; some of whom have been pleased to extend their commendations to terms of equal efficiency with the Royal Service. The deprivation of a system which during a long period of arduous trial, has been found to impress its Officers and Men with every confidence in its details, would in their belief be sacrificing the essential qualities, which in their estimation constitute the real utility and merits of this important arm.

A few observations appear necessary regarding the several estimates before the Board for the organization of a Troop, with, and without, Detachments, as required in Bengal and Bombay; in Bengal without Detachments, mounting Men on the Off Gun Horses, 130 Men, and 184 Horses are stated to be required: the Horses for each Gun and each Waggon are estimated *at* 13, giving 6 Horses for each Carriage in draft, and *seven more* as a *relief* for the six. Whereby it would appear to be the intention of granting a full relief for each set in draft; but, as there are 130 Europeans and two Natives (Farrier and Doctor) attached to the Troop, all of whom are mounted, it follows that there must be 132 Horses with riders and 22 draft Horses without riders, making a Total of 154 which taken from 184 leaves only 30 spare Horses instead of a double set to relieve the 80 in draft, no allowance being made for sick!

In the estimate on the system *with Detachments*, the draft Horses are calculated upon the *same scale* as when riders are mounted on Off Horses; the relief afforded to those in draft, by mounting the men on separate Horses, would appear to be insufficient to warrant a reduction in the number of draft Horses; with regard to men, 142 (including Native Farrier and Doctor) are allotted for a Detachment Troop; forty drivers are required for the 80 Horses in draft, and 102 men must be mounted on separate Horses, which 182 from 244 will leave only 62 Horses instead of a double set to relieve the 80 in draft; as it would appear to be the intention of securing for the Troop!

The Bombay distribution accounts for the services of every man, and the allotment of every Horse deemed requisite for a Field Battery of the Horse Artillery. The proportion of spare is taken at half the number of draft, and as those are selected and set aside expressly for the purpose, relief for the draft Horses to that extent can be afforded. No allowance has been made for sick, and the strength of Detachments will depend on this contingency. But as it will be seen the estimate submitted is upon a moderate scale, a Troop to be effective should at all times be kept complete in the number of *Men* and *Horses* stated.

The aggregate number of Men and Horses in the Bombay scale, differs but little from that of Bengal, formed upon its proposed system, being

	Men.	Horses.
Bengal	130	184
Bombay	136	193

So that a Bombay Troop with separate Detachments exceeds a Bengal Troop with riders on the Off Horses by only 6 men and 9 Horses; while as a set off on mere score of expense, is the excess of the number of Syces allowed for a Bengal Troop!

Upon any system, a Corps of Horse Artillery must necessarily involve considerable expence. It appears desirable therefore, that such a plan of organization should be adopted, as will enable reliance to be placed by Government in having its expectations and calls executed in an efficient and ready manner, whether assimilation or uniformity in the mode of *mounting the men,* and *allotting the Horses,* be deemed advisable or not.

With regard to the adoption of the Bengal mode of mounting the Gunners on the Off draft Horses, I am bound to declare without qualification, my conviction derived from long service with the arm, and from the knowledge of the natural features of the Country of Western India, that such a mode of organization, would completely destroy the efficiency and capabilities of ready movement at present possessed by the Bombay Horse Artillery; and would place it in a position, unequal to meet similar demands to those hitherto successfully answered. One instance of which has already been referred to, of its marching during the Mahratta Campaign 2250 miles in seven months over a most difficult Country.

The Bombay Members with reference to the statements already given in, beg to remark, the 4 Troops of Horse Artillery are the only Field Artillery available for Service at the Bombay Presidency, with the exception of the 4 Guns without Waggons drawn by Mules, in the Province of Kutch.

(Signed) J. Stevenson, Lieut.-Colonel.
W. Whitlie, Secy. and Brevet Captain.

MINUTE.

My opinion with regard to the superiority of the 9 Pounder (of 10 cwt.) to the 6 Pounder as a piece of Field Artillery, is in perfect unison with that expressed by Major Tennant in his Minute, and I concur generally with that Officer in the view he has taken of the relative utility of these two calibrès for Effective service.

But I am still of opinion, that with the description of Horses at present in our ranks, and considering the nature of the country we have hitherto traversed, the weight of the 6 Pounder Carriage and Limber with its proportion of ammunition, is as much as should with reference to these points be allotted to 6 Horses. The correctness of this opinion has been frequently exemplified in the difficulty experienced in the draft of the Waggons, which with us have always been of heavier weight than the former; and again more particularly on the expedition under Sir Lionel Smith in 1821, against the Bemboo Ali tribe of Arabs; for with that Force, the only pieces of Ordnance that did not occasion inconvenience, were two six Pounders; whereas the four Brass, Light 12 Pdrs., which were horsed for that particular service, in lieu of 6 Pounders, were constantly brought to a stand still: the Country certainly was very sandy and rocky, and the Horses were out of condition, from the privation they suffered in the Boats that conveyed them from Bombay; Eight Horses however were constantly in the traces, but they were unequal to the work imposed upon them.

These are the reasons which induced me to give my vote in favor of 6 Pounders for Troops of Horse Artillery. The difficulty of effectually moving a heavier Calibre, and the uncertainty of placing such Guns in position, appearing to my judgement objections to their *universal* adoption, not to be compensated for even by the superiority of their fire.

But then as 9 Pounders and 6 Pounders have been allotted in the Royal Service, with reference to the seat of War and the Service contemplated, so could the allotment of these Calibrès to Batteries of Horse and Foot Artillery in this Country, be regulated by similar rules.

The establishment for a Troop armed with 5, 9 Pdrs. and a 24 Pounder Howitzer, (for one Howitzer should in my opinion be attached to each Light Field Battery) would be about 157 Men and 228 Horses, calculated upon the Bombay scale.

(Signed) J. Stevenson, Lieut.-Colonel.

Statement shewing the number, rank, and description of Brigade Staff, at the several Presidencies of Bengal, Madras, and Bombay, and that recommended.

	Bengal.	Madras.	Bombay.	Recommended.	REMARKS.
Adjutant	0	1	1	1	The Board think, that an Adjutant and Quarter Master in separate persons are indispensible to each Brigade, and that they should be effective.
Qr. Master.	1	0	0	0	
and Interpreter	0	1	1	1	
Riding Master	1	1	1	1	
Serjt. Major	1	1	0	1	
Qr. Mr. Serjeant	1	1	0	1	
Drill Serjeant	1	0	0	1	
Rough Rider Serjt.	1	0	0	0	
Farrier Major	1	1	1	1	
Trumpet Major.	1	1	1	1	
Drill Corporal	1	1	0	0	Transferred to Troops.
School Mr. Serjt.	1	1	0	1	
Hospital Serjeant.	1	1	0	1	

APPENDIX A.

MINUTE BY MAJOR TENNANT.

At our first meeting, I agreed with my Colleagues in adopting 5 six pounders and a 12 pounder howitzer, as the Equipment of a Troop of Horse Artillery, in deference to the orders of the Honorable the Court of Directors ; and it was on this ground only, that I acceded to an arrangement which I conceived we were precluded from discussing, believing that this would have been recorded as the reason of our decision. As however it has now been determined that our assent is to be given in unqualified approbation, in which view of the case I differ, and as His Excellency the Commander-in-chief, in his Minute to Council, calls upon us also to determine the best Calibrès in our opinion for Indian Service; I cannot subscribe to a simple recommendation of 6 pounders in preference to 9 pounders, which would I conceive, imply a conviction of their superiority, without recording the reasons of my preference for 9 pounders, and my belief that with them the 12 pounder Howitzer is nearly useless. In doing this I have no wish to excite discussion, but willingly accept the arrangement determined upon by the majority of the Committee, desirous only of explaining my reasons for dissent.

The Honorable the Court of Directors, have founded their orders on the opinion of Sir Alexander Dickson, a high authority I allow in matters connected with the Artillery, but it appears to me that that Officer has recommended the 6 pounder, and 12 pounder Howitzers for Indian Service, on an erroneous supposition, that from some peculiarities of the Service in India, we were unable to bring heavier Guns into the Field. If I am correct however, in supposing that this difficulty can be overcome in the same way that it was overcome in England, it seems not unfair to think that Sir Alexander Dickson himself would have altered his advice. The Honorable Court are in error I also think, when they state that 9 pounders were only used at the Battle of Waterloo, because it was a battle of position; I admit that this battle was one of position only, but I cannot conceive that the Duke of Wellington when preparing for the Campaign in Belgium contemplated this event, and provided solely with a view to it; but rather, that he substituted that nature of Ordnance in his Field Batteries, which had been in his judgment, found most effective against the French 8 pounders in his previous Campaigns: in this he evidently agreed with Officers of the Royal Artillery. Sir Alexander Dickson himself has told us in reply to some questions put to him on this subject from Bengal, "that the 9 pounder is a most efficient Gun, and I have no doubt will always be the piece "most used by us on Continental Service. Nine pounders "of 13 cwt. were the favorite Gun in Spain in the latter "Campaigns, and with the exception of the Horse Artillery, "and one Battery of long 6 pounders, all the rest were 9 "pounders. At Waterloo both the Horse and Foot Artil-"lery almost all had 9 pounders."

This indicates an increasing partiality for them, until they were at last adopted in the Horse Artillery, and Sir A. Frazer in his remarks on the organization of the Corps of Artillery, admits that the change then made was "Judicious," and "that had the light pieces been suffered to remain, it might "have had a considerable effect on the fortunes of the day;" the state and relative utility of such of the Troops as retained their lighter Guns, and were in exposed situations very strongly corroborates this idea. Subsequently, in consequence of this experience, the select Committee of Artillery Officers at Woolwich, proposed to have all the Field Batteries on Foreign Service, both in the Horse and Foot Artillery, composed of 9 pounders, recommending however, that as six horses had not been found sufficient for them in Spain, eight horses might be allowed. From all this, I entertain the belief that 9 pounders were adopted in the Horse Artillery at Waterloo from a conviction acquired on actual service, that they were best adapted for general purposes, and that they were only laid aside when on Home Service, during the peace which followed; contemplating (as the Woolwich Select Committee prescribes for equipments of this nature) only for the service of fixed Districts, but with the acknowledged proviso, that in event of actual warfare, they must be placed on the Foreign Service scale. I have not a doubt therefore, that for Foreign Service, 9 pdrs. are now, as they were then, preferred by the Royal Artillery; and I think we shall not only find no peculiar circumstances in Indian warfare, to lead us to a different conclusion, but even such as would strongly recommend the same.

Sir Alexander Dickson further gives us his reasons for recommending 6 pdr. Guns and 12 pdr. howitzers; that they are very efficient in dispersing large bodies of Cavalry, apparently misled by an impression, that this was the principal use of Field Artillery in India. But we have unfortunately found, that the Native Powers can bring heavy and efficient Artillery against us; and in no instances I believe, when they have done so, has our Field Artillery been able to cope with them. The result of the battles of Assaye,* Laswarrie,† Putpergunge,‡ and Mahidpoor,|| are quite satisfactory proofs to my convicton, that our Field Artillery has always been heretofore nearly useless when so opposed, and

* See Appendix A.
† See Appendix B.
‡ See Appendix C.
|| See Appendix D.

one reason of this, is recorded to be the superior Calibers of the Enemy's guns; other instances of minor importance, have not been wanting to my own observation to prove, that a heavier gun than a 6 pounder is often very desirable, and sometimes when detached with few guns only, and no other assistance at hand, absolutely necessary; and on the whole my persuasion is, that nothing short of the impossibility of bringing them into the field should prevent, if it was left to our own choice, our recommending the 9 pounders to be generally used in our batteries, Horse and Foot; and even if a small proportion of lighter calibers were retained for Service with the Cavalry in foraging parties, advanced guards, or excursive Service, when the quantity of ammunition is of more importance than the weight of shot: this should be the only exception to the general principles of our equipment.

If on general principles then, I arrive at this conclusion, I think it of primary importance that our Horse Artillery, should be provided with the most efficient ordnance, so long as our Foot Field Batteries are drawn by bullocks. It seems to be admitted by all of us, that the Bengal bullocks are of a superior description to those of the Madras and Bombay Presidencies, and from the past history of our transactions in Bengal, as well as from my own experience as far as it goes, I am well satisfied that our Infantry will never have the support it ought to have from our Field Artillery, while our Batteries are so drawn. The very nature of the animal precludes such an expectation, and it has been too frequently the complaint of the Artillery Officers in Bengal, that they were unable to assist the Army to their satisfaction. This was more especially the case with Sir J. Horsford, who besides a Service in the Field of some years with the coast Army, had the experience of the Bengal Army in the Field during the War in 1803, 1804, and 1805; Colonel Horsford hoped to have been able to overcome the difficulties he had experienced in these campaigns, by introducing discipline among the drivers and bullocks, and the estimation in which he held these difficulties may be conceived from the following account of them; "the trouble and assiduity" he says "of tuition in the Corps of ordnance drivers, and bullocks, "is far more intense than in the Cavalry or Horse Artil- "lery. Here the animal is the bulky bullock; his director "a man walking on foot at his shoulder, his bridle a com- "mon rope thrust through his nostrils, which affords little "or no control over the animal, especially in the material

" action of turning, his temper also often refuses to be " directed." To overcome these difficulties at all he observes, " requires constant Drill, and not partial exercise as in " other Corps," but even with this, we know that his expectations were disappointed, and it is noticed by Colonel Pennington in his evidence before the House of Commons, as the result of his experience in the same campaigns as Sir J. Horsford, and of sixteen years Service subsequent to the first endeavour to discipline the drivers and bullocks, that " the cattle of the Foot Artillery are perfectly inefficient" and that " guns dragged by bullocks never can be brought " into action."

I have myself seen, and been instrumental in conducting experiments in Lord Hastings Camp in 1817-18, which perfectly satisfied every Officer of Artillery and Infantry present, as well as Lord Hastings himself, that a Field Battery even when taken fresh from the Park, with the bullocks and drivers in the best order, could not manœuvre with a Brigade of Infantry, in soft or* rugged ground, so as to give it proper support ; and I cannot therefore persuade myself otherwise, than that while we are compelled to use a sulky and obstinate animal, we must be disappointed in him when fatigued by a march of only moderate extent, previous to an action. When then we shall be again called into the field, our Horse Artillery Troops will no doubt have to fill up the place of the Foot Artillery, and we must now consider them as our main dependence for the support of our line, unless better draft is allowed to our Foot guns ; with this view it is, that I place so much importance on their being supplied with, and rendered capable of using the most efficient ordnance.

I am ready to admit with my colleagues, that if we are restricted to 6 Horses in draft, it is a fatal objection to the use of 9 pounders, for although our guns may weigh only 10 cwt, yet owing to the different specific gravity of the Indian woods, I have found that when equipped with carriages at our gun Carriage Agency, and furnished with their proportion of ammunition, the weight to be drawn will be nearly equal to that of the 13 cwt gun in England, and even making allowance for the lightness of the cheek carriage, when compared with our beam trail, I fancy they will still require like the English guns, to be drawn by 8 horses.

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* Dry ploughed fields are meant.

But I am not aware of any objection to use 8 horses in India, as well as in England; nor do I conceive that the expense of doing so would be unreasonable, for the 2 extra horses per gun, would be nearly all the extra expense during peace, and during War the ammunition (beyond what could be carried in one waggon per gun, as for the 6 pounder) might travel in the Park and be drawn by bullocks.

Conceiving then, that it is quite possible to bring 9 pounders into the field with our Horse Artillery, and that the advantages they possess over 6 pounders, would warrant the expense of doing so; I think the 12 pounder howitzer would in that case be rendered nearly useless, I am not myself an advocate for shell pieces in a Field Battery of any kind, except when in position. I conceive that when a Battery itself is in constant movement from one point to another, and when the troops against which it is acting are also in motion, no correct estimate of distance can be formed, and consequently no accurate shell practice can be carried on. The more frequently and the more suddenly these changes are made, the more difficult it is to obtain accuracy, and the Service of the Horse Artillery being most liable to these sudden and quick movements, its effective shell practice must be rendered most uncertain. The few cases that may be considered as exceptions to this, need hardly be provided for by a permanent Establishment, but, as they are such as may generally be foreseen, may be left to be provided for by a particular arrangement. At the same time I would not on my own opinion deprive any one of an arm he considers useful, and therefore, as the majority of the Committee appear to approve of Howitzers, I do not object to leave them with the Troops of Horse Artillery. Nevertheless I conceive, that with six 9 Pounders, the fire with Shrapnell Shells and Grape, would be superior to Five 6 Pounders and One 12 Pounder Howitzer; and that while the effect would be rather increased by adopting them alone, simplicity would be promoted, not only in the Troop, but by laying aside a piece of Ordnance of a particular Calibre and applicable to this purpose only, for it is not intended that it should be used in our Foot Bat-

Shrapnell.

5	6	Pounders have Balls	180
1	12	Howt. ,,	75
		Total	255
6	9	Pounders have Balls	360
		In favor of 9 Pounders	105

teries; and for any other service, I conceive it is too much of a Howitzer to be a good Gun, and too much of a gun to be a good Howitzer. While it is still desired to retain Howitzers with the 9 pounders, the 24 pounder Howitzer being of the same weight, may be equally well drawn, and is a superior piece of Artillery to the 12 Pdr. Howitzer.

Grape.

5	6	Pdrs. have about	150	Balls
1	12	Howt. ,,	64	,,
		Total	214	,,
6	9	Pdrs. have about	276	,,
		In favor of 9 Pdrs.	62	,,

(Signed) J. Tennant, Major.

The following are Extracts of the notes on the Mahratta War, published by authority.

Appendix A.

ASSAYE.

" The British Artillery had opened on the enemy at the " distance of four hundred yards, but General Wellesley " finding that it produced little effect on the enemy's power- " ful and extensive line of Infantry and guns, and that his " guns could not advance on account of the number of men " and bullocks that had been disabled, ordered his artillery " to be left behind and the whole line to move on." The whole line led by the Major General in person, advanced to the charge with the greatest bravery and steadiness, without its guns, against a most severe and destructive fire of round and grape, until within a very short distance of the enemy. Several officers in General Wellesley's Army who had served during the late Campaigns on the continent of Europe, have declared, " that it is no disparagement to " the French Artillery to say, that cannon were never better " served than by the enemy at Assaye."

The enemy had on this occasion 2, 24 pdrs. 8, 18 pdrs. 10, 16 pdrs. 3, 12 pdrs. 1, 10 pdrs. 4, 9 pdrs. 3, 8 pdrs. and 27, 6 pdrs. besides smaller guns and howitzers amounting in all to 98.

APPENDIX B.

LASWARRIE.

" At the battle of Laswarrie the army marched previously " 25 miles, much of the Artillery was consequently in the " rear, but as many of the field pieces of the British army " as could be brought up, (which by the plan appears to have " been only 8) together with the galloper guns attached to " the Cavalry, (by the plan 10) formed four different Batteries to support the attack of the Infantry. The British " Infantry advanced to the attack, and as soon as they became exposed to the enemy's guns, the four British Batteries commenced their fire and continued to advance notwithstanding the superiority of the enemy's artillery, both " in number and *weight of Metal;* the cannonade on both " sides was extremely severe, the enemy's Artillery was exceedingly well served. As soon as this small body of brave " men." (One European Regiment and two Native Battalions) " arrived within reach of the enemy's canister shot, " a most tremendous fire opened from the enemy's Artillery. " The loss was very severe, and the heavy cannonade from " the enemy's line was sufficient alone to prevent a regular " advance." The enemy had 1, 18 pdr. 6, 14 pdrs. 26, 6 pounders, besides smaller guns and howitzers amounting in all to 71.

APPENDIX C.

PUTPERGUNGE.

" The British army reached the ground of encampment " at eleven o'clock. The Troops were much fatigued with " the length of the march, (18 miles) and the heat of the " weather, and the Tents were scarcely pitched when the " enemy appeared. The Commander in Chief proceeded to " reconnoitre them with the whole of the Cavalry, and found " the enemy drawn up on a rising ground in order of battle, " their position was strong and their numerous Artillery covered their front. Orders were sent to the camp for the " Infantry and Artillery to join the Cavalry, which had ad-

" vanced about two miles in front, but notwithstanding the
" expedition with which the British Troops got under arms,
" one hour elapsed before the Infantry could join them."

N. B. The guns were even behind the Infantry. " The
" whole of the British army (when formed) advanced to-
" wards the enemy, notwithstanding a tremendous fire of
" round, grape, and chain shot, until they had reached with-
" in one hundred paces of the enemy, when the enemy com-
" menced a heavy fire of grape from all their Artillery." Lord Lake says in his despatch to the Governor General, " our
" loss has been very great, but when I consider that we
"moved on against an immense Artillery of nearly 100 pieces
" of Cannon, and many of a very heavy Calibre, under as
" heavy a fire as I have ever been witness to, it is no longer
" a matter of surprise." The enemy had 2, 20 pdrs. 5, 18 pdrs. 3, 16 pdrs. 3, 12 pdrs. 15, 6 pdrs and others of smaller Calibre, with howitzers, amounting to 68 pieces.

APPENDIX D.

MAHIDPORE.

The following is Extracted from Colonel Blacker's account of the Battle of Mahidpore.

" To Sir J. Malcolm was given the immediate command
" of the two Brigades of Infantry, destined to the attack of
" the enemy's left. The whole of this operation was per-
" formed with great steadiness, under a fire of both round
" shot and grape from several Batteries. By this time the
" Horse Artillery were either silenced or dismounted, for
" their light pieces were unequal, however well served, to
" stand against the heavy Calibres in their front.

(Signed) J. TENNANT, Major

(True copies)
Signed) J. STUART, Lieut. Colonel.
Offg. Secy. to the Government of India,
Military Department.

APPENDIX E.

No. 236.

Extract from the Minutes of Consultation. 27th Jan. 1835.
Read the following letter from the Secretary to the Government of India, Military Department at Fort William.

No. 184.

To THE DEPUTY SECRETARY TO GOVERNMENT,

In the Military Department
at Fort St. George.

SIR,—In continuation of documents forwarded to you with my communication No. 107. dated Ootacamund 12th Sept. 1834, I am directed to transmit to you for the purpose of being laid before the Right Honorable the Governor in Council for information, the accompanying copy of a Military letter No. 18 from the Honorable the Court of Directors, to the Governor of the Presidency of Bengal, dated the 11th. July last ; and of a letter from Sir Alexander Dickson which accompanied it.

(Signed) W. CASEMENT, Colonel
Sec. *to Govt. of India Mily. Dept.*

FORT WILLIAM, 10*th Dec.* 1834.

MILITARY DEPARTMENT

No. 18. of 1834.

Our Governor of the Presidency of Fort William in Bengal.
Reply to a letter dated 19th January 1833, No. 11.

In continuation of separate letters dated 19th December 1831, (No 101) and 4th May and 14th July 1832, (Nos. 59 and 79) forward the Report of the special Committee of

Para 1.—We have now to acknowledge the receipt of your separate Military letters dated 19th December 1831, 4th May and 14th July 1832, and 19th January 1833, and

Artillery Officers assembled at Bombay, for the purpose of repeating the experiments made in Bengal, to ascertain how far the Light 9 pdr. Brass Gun, and 24 pdr. Howitzer, could be depended upon on actual service.—This Report completes the series called for by the Governor General; also submitting drawings &c. of the new cheek Carriages with contracted trail, which have been introduced by Captain Miller of the Bombay Artillery at Matoongha, and which are strongly recommended by the select Committee of Artillery Officers, and by the Commander in Chief at Bombay as preferable to those now in use.

to state, that we have taken into our most serious consideration, the whole of the voluminous correspondence connected with the important subject thus again brought to our notice.

2. The view we had previously entertained of the changes contemplated in your Light Field Ordnance, was fully detailed in our Military Letter of the 16th December 1828.

3. To these changes we had scarcely yielded a reluctant consent, when your Reports were received detailing failures in Axletrees and Carriages, and expressing doubts of the efficiency of the very Ordnance, the introduction of which you had so urgently requested us to sanction.

4. It is much to be regretted, that full and extended experiments had not preceded these innovations upon an old and established system.

5. We shall now proceed to communicate our views upon this long pending question, and we have no hesitation in expressing our decided opinion, that the armament of all the Horse Artillery in India, should be with Light 6 pounder guns, and 12 pounder Howitzers; these being perfectly efficient pieces, capable of very rapid movement, and carrying with them a large proportion of Ammunition, that would enable the Horse Artillery effectually to cover the movements of an Army, particularly when in opposition to large masses of Cavalry.

6. Experience has shewn the difficulties that are opposed to the progress of Horse Artillery even with 6 pounders, during forced or long continued marches over bad roads and other obstacles; and we feel satisfied, that 9 pdrs. cannot be substituted for them without still further encumbering and retarding the movements of a Corps, which should be cha-

racterized as well by celerity, as by precision and power of continuance.

7. A similar view appears to have been taken of this part of the question, by the Governor General and Commander in chief, and by the Madras and Bombay Authorities, although opposed by the professional opinions of the Officers of the Bengal Artillery.

8. The instance adverted to by the Bengal Artillery Officers, of the employment and utility of 9 pdr. guns with the Horse Artillery at Waterloo, is not conclusive, seeing that, that was a Battle of position, preceded by no long or harassing marches, and that the success of that day, has not led to a permanent organization of the Royal Horse Artillery with guns of that calibre.

9. The 9 pdrs. even of reduced weight, we consider inappropriate to our Indian service, where the Horses are of inferior strength and size compared with those of Europe.

10. We therefore desire that the 9 pdrs. with which some of the Troops of Horse Artillery have been furnished, may be replaced with 6 pdrs. and that as in the Royal Artillery, 12 pdr. hozitzers be substituted for the 24 pdrs. which on the ground of weight, are equally objectionable with the 9 pdr. Guns.

11. There does not appear to be any peculiarity in the Indian service, that should operate against a conformity in this respect with the Royal service, an object which should always be kept in view to every practicable extent.

12. With regard to the introduction of the new 9 pdrs. into the Foot Artillery, the same objections do not apply as in the instance of the Horse Artillery.

13. The doubt here is of the efficiency of the gun itself, and though as observed by the Governor General, it is after all, but an average piece falling short altogether of the English 9 pdrs. of 13 cwt. and perhaps with round shot, little if at all superior to the 6 pdrs. still, as the advantage it has over the latter with Grape and Spherical case shot, has been established bv the experiments instituted at each of the Presidencies, and looking to the disuse of the brass 12 pdrs, the mode and means of draft, and the lesser degree of activity expected in the movements of Foot Artillery, the introduction of the 9 pdr. gun into that particular arm is authorized.

14. We are however inclined to think, that the 9 pdr. of 8 cwt. 3 qrs. is somewhat too light, one of the same length, but with the weight of 10 cwt. would we think, render that piece still more efficient. Indeed we should have been induced from the opinion of the Bengal Government, and the valuable remarks of Colonel Morison, to have introduced into our service the English 9 pdrs. of 13½ cwt. and 24 pdrs. howitzer of 13 cwt. but we think deference is due to the concurrent voices of the committees at the three Presidencies, which are in unison in advocating lighter ordnance of those natures, for their Field Battery service.

15. The 24 pdr howitzer as constructed at the Calcutta Foundery, stands as regards efficiency, upon much higher grounds than the new 9 pdrs. But the one cast at the suggestion of the Madras Government, of somewhat heavier metal, has, we consider, the advantage over the lighter piece.

16. We therefore desire, that in casting new ordnance of that nature, the weight should be fixed, say in round numbers at 10 cwt.

17. We would suggest however, the expediency of having a limited proportion of 24 pdr. howitzers of the English construction, weighing 13 cwt for pieces of position, and to be employed with light Field Battering Trains, the charge being 2 lb. 8 oz.

18. The 12 pdr. howitzer should (as in the Royal Service) replace the light 5½ inch howitzer.

19. The service charges for the new 9 pdr. and for the howitzer, together with the proportion in which they should be allotted to Batteries, we leave to your decision. We are however inclined to think with Sir Alexander Dickson, (whose opinions we have sought on this interesting occasion, and a copy of whose letter to our Secretary on this subject, we transmit a number in the Packet,) the following charges will be found best adapted for Field Service, to ensure precision and effect.

For the	9	Pounder........	2	lbs	4	Oz.
„	24	„ Howitzer	2	„		„
„	12	„ „	1	„	4	„
„	6	„ Gun	1	„	8	„

20. With regard to the carriages, the reports from Dum Dum and those forwarded from Madras and Bombay, fully establish the efficiency of those latterly constructed and used at the trials of the new Ordnance. But the question still remains, as to the particular pattern carriage to be established.

21. In our Military letter of the 3d July 1833, (No. 59.) we have noticed the gun carriages constructed by Lieutenant Colonel Cullen. These carriages seem to merit every attention, being convenient for exercise and manœuvre, and free from the objections of having the block trail perforated. As regards those proposed by Captain Miller, and which are alluded to in para. 4 of your Military letter of the 19th January 1833, we are not prepared in the absence of all plans or drawings of them to give any opinion.

22. This leads us to remark upon the want of uniformity observable in the Ordnance Departments of the three Presidencies.

23. Each Government recommends its own fancied superiority in ordnance improvements, and advocates the suggestions of its own Artillery Officers, little or no attention is paid to what may be already in useful operation at the sister Presidencies, and comparisons which might be beneficial and lead to uniformity, are seldom made.

24. We desire that you will obtain every necessary information and detail from the other Presidencies, to enable you to establish one uniform system, which without advocating or upholding any local one, should have reference only to the Establishment of a clear and well digested code, for the regulation of all the ordnance of India.

LONDON.
11*th July*, 1834.

(Signed) H. St. G. Tucker
W. Stanley Clarke
J. Morris
H. Lindsay
John Forbes
H. Shank
H. Alexander
W. B. Bayley
N. B. Edmonstone
J. Thornhill
Russell Ellice
W. Young
John Cotton.

(True Copy)
(Signed) W. CASEMENT, Col.,
Secretary to the Govt. of India,
Military Department.

" DUPLICATE."

LIEUTENANT COLONEL SALMOND,

&c. &c. &c.

Sir.—In attention to the request of the Honorable Chairman, that I would express my sentiments upon the papers relating to the Ordnance for the Horse Artillery, and Field Batteries in India ; I have most attentively read over, and considered every part of the collection contained in the volume you sent to me, which is herewith returned, and also the detached Memorandum ; and having carefully compared the various arguments and reasoning on the subjects in question, I beg with due deference to submit to the Chairman, the opinions I have formed thereon, viz.

Armament for the Horse Artillery.

I am decidedly of opinion, the armament for all the Horse Artillery in India, should be with light 6 pounder and 12 pounder howitzers, these being perfectly efficient pieces, capable of very rapid movements, and carrying with them a large proportion of ammunition, that would enable the Horse Artillery effectually to cover the movements of an Army, particularly when in opposition to large masses of active Cavalry. The Establishment of these calibres would occasion no increase of men and horses, whilst the Troops would be more simply and better armed, than they were formerly with three calibres, the two howitzers of which were nearly useless, I submit therefore, that each troop of Horse Artillery should be armed as follows, with

4 Light 6 pounders
2 12 Pdr. howitzers English construction of 6½ cwt

Total . . 6 pieces

That the charges of powder for these pieces be
For the 6 pounder...... 1 lb 8 oz. } Of powder
For the 12 pdr. howitzer.. 1 lb 4 oz. } Of powder

And the carriages to be proportionably strong, to admit of the continued use of these charges.

Armament for Field Batteries.

Field Batteries ought never to consist of more than two calibres, by which the details are more simple, and there is greater latitude to render the ammunition available.

I should have been strongly induced, from the valuable remarks of Colonel Morison, and from the opinions of the Supreme Authorities, to have at once recommended the English 9 pdrs. of 13½ cwt, and the 24 pdr. howitzer of 13 cwt, for the sole use of the Indian Field Batteries; but I think every deference is due to the concurrent voices of the committees at the three Presidencies, which are in unison in advocating light 9 pounders, and light 24 pounder howitzers, for their Field Battery service; I would therefore recommend, that every Field Battery throughout India should be composed as follows.

	6	Light	9 pounders	
	2	„	24 „	Howitzers
Total	8	Pieces		

The charges of powder for these pieces to be as follows:

For the 9 pounder......	2 lb 4 oz.	Of powder
For the 24 pdr. howitzer..	2 lb „	

The carriages to be proportionably strong in every respect for these charges, and here I would beg to add, that the carriages proposed by Lieutenant Colonel Cullen at Madras, and by Captain Miller at Bombay, in both cases constructed with cheeks and contracted trail, seem to merit every attention, as they would be convenient to manœuvre with, and at the same time they appear to obviate the objections that have been experienced in India, in perforating the block trail.

I must now particularly call the attention of the Chairman to the Madras select committee report, with regard to a 24 pounder howitzer made heavier according to the proposal of Colonel Pearse, which weighs 9 cwt. 3 qrs. 12 lb. this is considered by the Committee more efficient, and far preferable to the howitzer of the Bengal construction, weighing 8 cwt. 3 qrs. 5 lb. the carriage of the former being very little heavier than the latter; whilst the Bengal carriage during the experiment, jumped most violently, and was soon destroyed. I am therefore of opinion, that the Bengal 24 pdr. howitzer is too light, and when the present stock is worn out, I would strongly urge, that orders should be given for all cast in future being made heavier, say in round numbers 10 cwt. as suggested by Colonel Pearse.

In like manner from these trials, I have arrived at the conclusion, that both the Bengal 9 pounders 8 cwt. 3 qrs. and those sent out of my construction, weighing 9 cwt, are too light for Indian service, and that it would be better when the stock of these pieces is distributed, and new ones are required, that they should be constructed of the same length as the present Bengal 9 pdrs. but with the weight of 10 cwt. : and I conceive these additions to the 24 pdr. howitzer, and 9 pdr. would render the Indian Field Battery highly efficient:

I would nevertheless, submit the expediency of having a limited proportion of 24 pdr. howitzers of the English construction weighing 13 cwt. for pieces of position, and to be employed with light Battering Trains, the charge being 2 lbs. 8 oz. of powder; and further, that light 6 pdrs. should be continued to be used as station guns, and with Field Batteries occasionally, when expedition is required in a difficult country.

I think when a system is established, that it would be most beneficial to enforce its being strictly observed throughout all the Presidencies, without the slightest deviation as to the construction of Ordnance and Carriages, the charges of powder, and the equipment in general; and here I beg to recapitulate the charges of powder indispensible for *precision* and *effect*, which ought therefore never to be diminished on Field service in India, for which reason the construction of guns and carriages, must be made to correspond in weight and strength,

Light 9 Pounder	2 lbs.	4 ozs.	Of Powder
Light 6 „	1 „	8 „	
24 Pdr. Howitzer	2 „	„	
12 „ „	1 „	4 „	

and the English 24 pdr. howitzer of 13 cwt. if used, 2 lbs. 8 ozs. of powder.

I have deemed it the more requisite to repeat this, as I observe the Meerut Committee in their observations upon the proceedings of that at Cawnpore, state, that since 1814 the Bengal Horse Artillery have invariably used $\frac{1}{6}$ charge of powder on service, or 1 lb. for a 6 pdr. which I consider quite inadequate to ensure effect and precision.

In concluding I have to observe, that I think the question of mules which I find have been in use with part of the Bombay Field Artillery, deserves every enquiry as to the means of procuring them of a suitable description, the expence of purchase and conveyance to the point required, as well as of foraging them. I have served with Artillery drawn by mules, and fully know their efficiency and durability.

WOOLWICH,
8*th April* 1834.

(Signed) A. DICKSON, Col.
D. A. Gen. Royal Artilley,
and Inspector E. I. M. S.

(True copy)
(Signed) W. CASEMENT, Col.
Sec. to Govt. of India,
Military Department.

" Ordered that a copy of the above communication be transmitted to the Military Board.

(True extract and copies)
(Signed) R. CLERK,
Secretary to Government.

FROM THE BOARD OF ARTILLERY OFFICERS OF THE THREE PRESIDENCIES.

To COLONEL CASEMENT, C. B.
Secretary to the Government of India
Military Department.

Dated 21*st* *September* 1836.

SIR,—We have the honor to forward a minute submitted by the Madras members of our Board, which we request may be laid before Government, with a view of being annexed to our Proceedings regarding the Horse Artillery.

W. S. Whish, Colonel and President.
J. Stevenson, Lieut. Colonel.
J. Tennant, Major.
G. Conran, Major.
R. S. Seton, Captain.
W. Whitlie, Bt. Captain.

MINUTE.

One of the main objects of the assembly of the present Ordnance Board, being the assimilation of the Artillery in the three Presidencies, in all points of Organization, as well as equipments ; we, the Madras members would bring to notice the anomaly exhibited at present by the Horse Artillery on that Establishment, in respect of the first of these objects.

Pursuant to the orders of the Court of Directors, received in 1824, it was placed on a footing corresponding with the same arm in the other Presidencies, and analogous to that of the whole of the other branches of the Company's army.

It was formed into two Brigades, (one an European and the other a Native) each consisting of four Troops.

In 1831, (vide Extract General orders annexed) however, an extensive reduction of it was made, and along with that an entire revolution in its constitution was effected. The two Brigades were condensed into one, totally reducing two of the Eight Troops, and placing the Establishments of those kept up, on a more reduced, and we may add, on an inefficient scale.

The effective strength of Officers was made to consist of,

1 Lieutenant Colonel.
1 Major.
6 Captains.
18 First Lieutenants.

instead of

2 Colonels.
2 Lieutenant Colonels.
2 Majors.
10 Captains.
18 First Lieutenants and 8 Second Lieutenants.

The effect of this change has not only been detrimental to the Corps at large, in its tendency to disorganize it, but it has in particular borne hard on the Officers.

Besides creating the anomaly just adverted to, it has been the means of subverting the due proportion, which the Horse Artillery should bear to the whole Madras Army; as well as that which should subsist in that particular branch, in the three different Presidencies, leaving in the number of Troops, the ratio as regards Bengal only $\frac{1}{2}$, and as regards Bombay only $\frac{3}{2}$ both of which are greatly too small, if advertence be had to the relative strength of the Armies respectively.

Its operation too, bears hard on the Officers generally of the Madras Artillery, by causing so great a diminution in their chances of appointment to the mounted branch of the Corps, and likewise by reducing the proportion of the commands of Corps, and Regimental staff appointments, below that existing in all other corps, and in all branches of the Company's regular Army in India; being now of course only as five to six, there being but 5 corps with officers for 6.

The plan on which this great reduction was effected, providing only for the prospective disposal of the men becoming supernumerary, has thrown a large body of able bodied and properly trained Horse Artillery men on the hands of Govt.

It adopted the measure of absorption by vacancies of all such as might decline entering into the Cavalry service, and as this option was scarcely in a single instance accepted, and considering that the portion left effective, bore so small a numerical proportion to that to be absorbed, it has turned out as might have been expected, that the process has been of exceedingly slow operation, for now, even after the lapse of so long a period, there remains a very large portion indeed (about 300) still unabsorbed, and who continue to draw pay as Horse Artillerymen, but being without Officers attached, or having any specific or appropriate duties to perform, are, as may easily be imagined, under such circumstances, worse than a mere burthen to the corps and to the state.

We deem it not irrelevant to state these circumstances here, with a view to bringing them under the consideration of the Supreme Government, and under a hope, that it may see fit to adopt, or recommend some measure, tending to adjust the existing discrepancies to which this brief statement refers.

(Signed) G. Conran, Major Madras Horse Artillery.
R. S. Seton, Capt. Madras Horse Artillery.

No. 31.

GENERAL ORDERS BY GOVERNMENT.

Fort St. George, 2d February 1831.

The Right Honorable the Governor in Council has resolved, that the Horse Artillery on this Establishment, shall be reduced to one Brigade, to be denominated the "Horse Brigade of Artillery," consisting of six Troops, four European and two Native; and that the Troops beyond the Frontier, be allowed six Guns, and those within the Frontier four Guns each; the European Troops 9 pounders, and the Native 6 pounders, with a corresponding number of Ammunition waggons.

The Commissioned Officers of both Brigades as at present established, will until further orders be consolidated under the same Commanding Officer, but all ranks of Commissioned Officers, present fit for duty who are supernumerary to,

1 Lieutenant Colonel.
1 Major.
6 Captains.
18 First Lieutenants.
1 Surgeon.
6 Assistant Surgeons.
1 Veterinary Surgeon.

are to do duty with the Foot Artillery, and those Officers only who are effective with the Horse Brigade, will draw Horse Artillery Pay and Allowances.

(True Copies.)

(Signed) J. STUART, Lieut. Colonel,
Offg. Secy. to the Govt. of India.
Military Department.

FROM THE BOARD OF ARTILLERY OFFICERS OF THE THREE PRESIDENCIES.

To COLONEL CASEMENT, C. B.
Secy. to the Government of India,
Military Department.

Dated 11*th February* 1837.

SIR,—On the arrival at the Presidency, of Major Graham, Bengal Horse Artillery, who was nominated in your letter of the 26th December 1836, to be a Member of our Board, we proceeded to take into consideration, the organization of a Troop of Horse Artillery, and have now the honor to transmit our report thereon.

We trust the report submitted, will meet with the approval of the Governor General of India in Council.

Signed
J. Stevenson, Lieut. Colonel,
Horse Artillery President.
J. Tennant, Lieut. Colonel Artillery.
C. Graham, Major Horse Artillery.
G. Conran, Major Horse Artillery.
R. S. Seton, Captain Horse Artillery.
W. T. Whitlie, Bt. Capt. Horse Artillery.

Fort William, 10*th October* 1836.

In continuation of their proceedings the Board record the following,

Read—Letter No. 236 of 23d September 1836, from Colonel Casement, C. B. Secretary to Government of India Military Department.

Read—Letter No. 172 from Colonel Casement, C. B. Secretary to the Government of India Military Department 10th October 1836.

Colonel Whish's Minute of the 21st September marked A in Appendix, being submitted by the President, and Major Tennant differing in opinion, thinks it necessary to apply for the assistance of a Horse Artillery Member from the Bengal Presidency.

The Board therefore adjourn their proceedings on this subject, pending the decision of Government.

Fort William, 5th January 1837.

Read—Letter No. 340 from Colonel Casement, C. B. Secretary to the Government of India, Military Department 26th December 1836.

Major Graham, Bengal Horse Artillery, takes his seat at the Board. Captain Dallas having received charge of the Office of Secretary to the permanent Select Committee of Artillery Officers, from Captain Cartwright, and also all the papers belonging to the Special Board of Artillery Officers, on the 1st January, has been called upon to officiate as Secretary.

The Board after most mature deliberation submit to the Supreme Government, the following scale of establishment for a Troop of Horse Artillery in India, as their unanimous and collective recommendation.

ESTABLISHMENT OF A TROOP OF HORSE ARTILLERY.

EUROPEAN TROOP.

1 Troop Serjeant Major.
1 Quarter Master Serjeant.
6 Serjeants.
1 Drill Corporal.
6 Corporals.
2 Rough Riders.
12 Bombardiers.
3 Trumpeters.
3 Farriers.
95 Gunners { 40 Drivers. 55 Gunners.
130 Total.

Non-Effective Staff.

1 Pay Serjeant.
1 Saddler.
1 Camp Colorman (in the Field).

Native Troop.

1 Troop Serjeant Major.
1 Quarter Master Serjeant.
1 Subadar.
2 Jemadars.
6 Havildars.
1 Drill Naick.
6 Naicks.
2 Rough Riders.
3 Trumpeters.
3 Farriers.
12 Bombardiers.
92 Gunners {40 Drivers, 52 Gunners} or 104 Privates.
130 Total.

Non-Effective Staff.

1 Pay Havildar.
1 Staff do.
1 Camp Colorman (in the Field,)

For a Troop either European or Native.

1 Nalbund

1 Assistant Apothecary or Native Doctor, agreeable to the regulations of the respective Presidencies.

Syces.

3 Jemadars, Chowdries, or Muccadums of Syces, in Cantonments, or in the Field.

In the Field 210 Syces, 1 to each Horse.

In Cantonments 157 Syces according to the following allotment. But with a view of attaching this valuable class to the service, by more permanent employ; the Board strongly recommend that no discharges be made from the Cantonment Establishment. This Establishment has been fixed with reference to the regulations of Madras and Bombay, and is less than at present allowed in Bengal. By the adoption of the recommendation now made, the Board apprehend no increase of expense will be incurred by the State, for the trifling saving which might accrue from the pay of a few Syces, at any time on the strength in excess to the number, by the proposed allotment; for occasional deviation in the number of Horses, would on the other hand, be made up by the rule which provides, one Syce to every Horse, which would become spare, when the number of Horse Artillerymen present, is short of the full complement. It must also be borne in mind, that Horse Artillerymen have all the drill and duties peculiar to mounted Corps, with the addition of their own professional duties; such as Gun drills, Laboratory duties, and Practice; which in this climate must be carried on in the mornings and evenings, and consequently they cannot on those occasions, devote their attention and labor to the very indispensable and important one of stable duty; the retention therefore of the proposed number of Syces as a fixed establishment, would ensure all these essential objects, and afford Horse Artillerymen the requisite time for professional instruction.

Allotment of Syces in Cantonments.

	Horses.	Syces.
1 Serjeant Major	1	1
1 Quarter Master Serjeant	1	1
6 Serjeants, 1 Syce to each	6	6
1 Drill Corporal	1	1
6 Corporals, 1 Syce to each	6	6
2 Rough Riders „	2	2
3 Trumpeters „	3	3
3 Farriers „	3	3
Staff and Non Commissioned &c.	23	23
6 Guns off horses, one Syceto each horse	18	18
6 Waggons off horses one Syce to each horse.	18	18
1 Forge carriage off horses one Syce to each horse	2	2
1 Spare carriage off horses one Syce to each.	2	2
Spare draft one Syce to each	40	40
1 Syce to every two remaining horses.	107	54
Total	210	157

Grass Cutters.

3 Jemadars, Chowdries, or Muccadums of grass cutters, in cantonments or in the field.

210. Being one grass cutter, or the pay of a grass cutter for every horse in Garrison, and in the Field, agreeably to regulations.

Horses.

According to the following allotment.

		Men	Horses.
Serjeant Major		1	1
Quarter Master Serjeant		1	1
Serjeants		6	6
Drill Corporal		1	1
Corporals		6	6
Rough Riders		2	2
Bombardiers		12	12
Trumpeters		3	3
Farriers		3	3
95 Gunners	Gunners	55	55
	Drivers	40	80
Additional half draft			40
Total for 6 guns, 6 waggons, 1 Forge, and 1 spare carriage		130	210

Bullocks.

	Bengal	Madras.	Bombay.
In Garrison and in the Field, for store cart with Limber	7	7	7
Additional in the Field, or when marching, spare ammunition waggon	7	7	10
Quarter Master's cart	5	5	7

A driver for each pair of bullocks.

Artificers.

1 Maistry smith, in Garrison, in the Field, or when marching.

A forge of 3 men as designated at the several Presidencies, for every two guns in the Field, or when marching; and for every three guns in Cantonment.

1 Maistry Carpenter in Garrison, in the Field, or when marching.

1 Carpenter for every two guns, in the Field, or when marching ; and for every three guns in Cantonment.

1 Moochee for European, and 2 for Native troops.

4 Bildars when in the Field, or marching without Pioneers.

Quarter Master's Etablishment.

The Board cannot further reconcile the regulations of the three Presidencies under the head of repairs of Arms, Quarter Master's, and Bazar establishments ; and therefore leave the remaining details to be fixed by the existing rules of the three Presidencies, with advertence to the increased number of men and horses.

But the Board recommend the introduction of the Bengal orders* relative to the repairs of ordnance carriages generally for the Indian Service, for the sake of efficiency.

Harness and Saddles.

12 Single sets of web harness with saddles two per gun.

90 Saddles riding, for Staff Non-Commissioned Officers and Detachments, exclusive of 40 driver's saddles, which are provided in the scale of harness.

92 Single sets of harness, including riding and pad saddles, according to the following allotment of harness.

		6 guns.	6 Waggons.	Forge carriage.	Spare carriage.	Spare accompanying.	Total. Single set.
Harness leading, single sets including riding and pad saddles	Near	12	12	1	1	4	30
	Off...	12	12	1	1	4	30
Harness pole, single sets including riding and pad saddles. . .	Near	6	6	1	1	2	16
	Off...	6	6	1	1	2	16
Total........		36	36	4	4	12	92

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* Vide Bengal pay and audit regulations pages 6, 10, 11.

MATERIEL OF A TROOP OF HORSE ARTILLERY.

Ordnance { 5 light six pounders
1,12 pounder howitzer

5, 6 Pdr. light field carriages with limber
1 „ „ „ „ „ spare
1 · „ „ „ „ 12 pdr. howitzer.
5, 6 Pdr. ammunition waggons, with „
1 „ „ „ 12 pdr.
1 Forge carriage with limber
14 Carriages drawn by horses

1 Spare ammunition waggon with limber
1 Store carriage with limber
1 Quarter Master's cart
3 Total drawn by bullocks.

In determining the foregoing establishment, the several systems of organization, as existing at the three Presidencies, have necessarily undergone minute discussion of their respective details ; and the result is, that whatever may be the mode adopted for carrying the Artillerymen, whether on the off horses as in Bengal, or on separate riding horses as at Madras, and Bombay ; the aggregate number of men and horses requisite for a troop, must be fixed by the number of carriages to be drawn by horses, and number of men to be mounted ; and that whether a troop be organized upon the one system, or the other, the number of men and horses will be alike.

The Board beg to observe, that if in the formation of establishments, the numbers be limited to those actually necessary to execute the immediate duties, the basis of calculation, will be found defective, inasmuch as casualties even to an extent apparently the most trifling, will cause the most serious inconvenience, rendering the relinquishment of a portion of the materiel unavoidable. Under the conviction therefore, that the Supreme Authorities will ever expect, that the proportion of Ordnance which has been fixed as the armanent of a Troop, will be effective when its services are required ; the Officers composing the Board, while impressed by a just sense of what is due to economy, feel it their bounden duty, to propose such a scale of establishment, as will not be immediately affected by those casual and ordinary contingencies, which must ever occur to reduce their strength, so that the proportion of Ordnance and Ammunition, ordered to be maintained, may be available for the instant service of the State, whenever called for.

The Board consider Horses requisite for the following Carriages.

6 Guns.
6 Ammunition Waggons.
1 Forge Carriage.
1 Spare Carriage.
14 Carriages

leaving the undermentioned to be drawn by Bullocks as heretofore.
1 Spare Waggon with Limber.
1 Store Carriage with Limber.
1 Quarter Master's Cart.
making a Total of 17 Carriages.

With regard to the establishment of men, the Board have been guided in fixing their numbers by the following principles. To ensure first, the number of drivers requisite for the 14 Carriages drawn by horses; secondly, the complement of men for the service of the Gun; and thirdly, spare men to replace sick, and casualties in either of the above; these, together, they have fixed at 130, for the establishment of a Troop, so that after deducting for sick, &c. they estimate 117 as the probable number of effectives, which may generally be calculated on for duty.

The Board is of opinion, that from the long period necessary to train Horse Artillerymen in their mounted and dismounted duties, Troops should at all times, be kept complete to the full establishment; they feel assured the necessity of this recommendation being adhered to, will be the more apparent, when it is known, that the number proposed, including drivers and working gunners, is in the aggregate 20 men less than fixed for a Royal Horse Artillery 6 Pounder service Troop, with a like number of Carriages; more particularly, as in this country casualties from climate are more numerous, liabilities to accident from restive horses more frequent, and the difficulties of completing Troops greater than in Europe.

To maintain therefore the efficiency of Troops, the Board are of opinion, that a number of men equal to the average casualties during the year, should be allotted with half the number of horses in a Depôt for Instruction, in anticipation of those casualties which may occur, and which they consider on a most moderate estimate would be 10 men per Troop, or one half the differenee between the establishment of a Royal Horse Artillery Troop, and that proposed in these proceedings ; so that vacancies in Troops may be filled up by soldiers who have acquired some knowledge of their mounted duties, instead of being completed, as at present with raw Recruits.

In fixing the number of Horses, the Board have held in view, the necessity for providing adequate means of draft for the 14 Carriages, with reference to the physcial powers of Indian horses, in comparison with those of Europe. Our Carriages being of greater weight, and our Waggons being somewhat heavier than our Gun carriages, and the almost impossibility of procuring remounts, as casualties take place, either in quarters, on a march, or when employed on service ; for these contingencies are not imaginary but real, having hitherto been of constant occurrence, and it can be asserted from past experience, that owing to these causes, and the insufficiency of existing establishments, Troops have been unable to proceed on service in an efficient state, without assistance from other Troops, (if any present) or leaving behind some of their equipment ; an alternative which the Board feel themselves bound to state, cannot fulfil the expectation Government have in view, in maintaining an Arm, the value of which consists in its perfect readiness for service. For the draft of 14 Carriages then, the Board have allotted draft horses in the proportion of 6 horses to each of the guns, and waggons ; and 4 horses to each of the two remaining carriages, or 80 horses, with 90 horses for the men, and one half of the number of horses in draft, or 40 spare, or a total of 210 horses, as the establishment of a Troop : but the whole number can never be calculated on as effective, being subject to reduction by the sick, lame, and wanting to complete.

It is to be observed, that as the quantity of work to be performed by a Troop, at all the Presidencies in drafting 14 carriages, and carrying 130 men, will be the same in amount, the number of horses should also correspond ; and whether the calculation be made upon the detachment system, with a half set of draft horses for spare, or upon the Bengal system of mounting the gunners on off draft horses, with a whole set spare, the aggregate number of horses will be the same.

The Bengal Members observe, that with the 184 horses formerly suggested by them, they proposed to carry two men on the limbers instead of the Lascars; but as the Board consider that this arrangement is inapplicable to Europeans, owing to the inconvenience experienced from it in Europe, and with Natives in India, they are of opinion it should not be adopted; 26 horses would therefore be necessary in addition to the number above proposed, to carry these men, making a Bengal Troop the same strength in horses as a Detachment Troop.

The Board cannot close their observations on the organization of the Troop, without adverting to the Minute on this subject by Colonel Whish their late President, dated 21st September, appended to these Proceedings.*

The discussions and scrutinies, which have occurred since he left them, have satisfied them his calculations are erroneous, and as no reasons have been assigned for the discrepancies in his different estimates, they can only conclude, that he had not at the time of his departure, entered so fully into the details of the several systems, as he probably would have done had he remained.

7th March 1837.

The Board having without difference of opinion concluded the formation of a Troop, with horses only, and Government having by Colonel Casement's letter, No. 236, dated 23d September 1836, called for a statement of a Troop of Horse Artillery aided by Bullocks on the Madras system: the Board regret that they cannot after much discussion with, and explanation from their Madras Colleagues, form a scheme founded on this system which they can recommend to be adopted, but being desirous that Government should be in possession of their Madras Colleagues sentiments on this subject, they request that they will record their plan, reserving such observations as occur to themselves, until this statement has been submitted.

STATEMENT SUBMITTED BY THE MADRAS MEMBERS,

9th January 1837.

Establishment of a European Troop of Horse Artillery, aided by Bullocks agreeably to the Madras system.

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* Appendix A.

Detail.

1	Serjeant Major.
1	Quarter Master Serjeant.
6	Serjeants.
6	Corporals.
1	Drill Corporal.
2	Rough Riders.
3	Trumpeters.
3	Farriers.
12	Bombardiers.
95	Gunners.
130	Total.
1	Troop Quarter Master (Warrant officer)
1	Assistant Apothecary or Native Doctor.
1	Camp Colorman (in the field.)

Ordnance.

6	Guns	To be horsed.
6	Waggons	
1	Spare carriage	
1	Forge cart	
1	Spare waggon	To be drawn at all times by bullocks.
1	Store cart	
1	Quarter Master's cart	

Horses.

Horses for the draft of the above carriages	82
Horses spare being one to each of these carriages	14
Total draft horses	96
To mount 89 Non-Commissioned rank and file exclusive of 41 drivers, Riding horses	89
Total horses	185

Bullocks.

For the draft of spare waggon, and store and Quarter Master's cart	21
Temporarily attached to the waggons as afterwards explained	60
Total	81

Harness.

Pole sets	32	Included in this, are, 46 off or pad saddles, and, 46 Riding saddles.
Centre and leading sets	60	
Web harness	12	

Saddles.

Riding saddles for the men to be mounted exclusive of drivers	84

Horse-keepers.

In Cantonments	132	
In the Field	185	
In Cantonments and Field	3	Chowdries

Grass-cutters.

In Cantonments and in the Field	185	
In Cantonments and in the Field	3	Chowdries

Artificers.

The same as in the system without bullocks.

Quarter Master's Establishment.

The same as in the system without bullocks.

Establishment of a Native Troop on the Madras system, aided by bullocks.

Detail.

1 Serjeant Major.
1 Quarter Master Serjeant.
1 Subadar.
2 Jemadars.
6 Havildars.
6 Naicks.
1 Drill Naick.
2 Rough Riders.
3 Farriers.
3 Trumpeters.
12 Bombardiers. } Or 104 Privates.
92 Privates.

130 Total.

1 Troop Quarter Master (Warrant Officer.)
1 Native Doctor or Assistant Apothecary.

Non-Effective Staff.

1 Pay Havildar.
1 Staff do.
1 Camp Colorman (in the field.)

Ordnance.

6 Guns.
6 Waggons. } To be Horsed.
1 Spare Carriage.
1 Forge Cart.

1	Spare Waggon.	To be drawn at all times by Bullocks.
1	Store Cart.	
1	Quarter Master's Cart.	

Horses.

Horses for the draft of the above carriages	82
Horses spare being one to each of these 14 carriages	14
Total draft horses	96
To mount 89 Non-Commissioned, Rank and File—Riding Horses.................	89
Total horses	185

Bullocks.

For the draft of spare Waggon, and Store, and Quarter Master's Cart................................	21
Temporarily attached to the Waggons as explained	60
Total	81

Harness.

Pole..........Sets	32	Including in this, are 46 off or pad, and 46 Riding Saddles.
Centre and leading	60	
Web Harness......	12	

Saddles.

Riding Saddles for the men to be mounted exclusive of Drivers...................................... 84

Horse-Keepers.

In Cantonments	132
In the Field......................	185
In Cantonments and in the Field....	3 Chowdries.

Grass Cutters.

In Cantonments and in the Field......	185
In Cantonments and in the Field......	3 Chowdries.

Artificers.

The same as in the system without Bullocks.

Quarter Master's Establishment.

The same in the system without Bullocks.

It will be observed that the detail of Non-Commissioned rank and file, is the same in all respects as for a troop on the detachment system without the aid of bullocks, as explained underneath, and that the complement of saddles and harness, and establishment of followers, are on nearly the same principle. The difference lies in the horses; the allotment of these, provides for every man being mounted, with 14 carriages (as in the other system) being horsed, and in addition one spare to each of those 14 carriages.

Bullocks (60 in number) are allotted for the waggons, but they form no integral portion of the troop, and are only required with it when it is in actual movement, or on actual service. This arrangement admits of the proportion of spare horses being so very limited, because a relief to those in the guns is thus provided on all ordinary occasions, whilst those specifically appropriated to the waggons, may, when in the vicinity of an enemy, or on any other occasion, be used for their draft only, or in part, as may be judged most expedient or found most convenient.

This system is not one of conjecture, it has always been in use with the Horse Artillery of the Madras Presidency, and has during a trial of many years, stood the most severe tests, both as regards cases of great sudden exertion, and of services of a constant and protracted nature.

It has the strongest recommendation on the score of economy, for as we think, that as well as ensuring the full amount of efficiency of the other, it admits as will be observed by comparison, of a reduction of 25 horses in the establishment of a single European troop, and which if extended to the whole Indian Horse Artillery, would effect a saving to a very great amount. To counterbalance this saving, the 60 bullocks must of course be taken into consideration, though on the footing on which they are provided, the expense incurred on their account can only be occasional, and generally very temporary.

And even should it be considered advisable to keep up any permanent establishment of these, it is quite obvious, that in times of peace, their services may be made available in numerous ways, connected with the Ordnance and Magazines, so as either wholly or in a very great degree, to effect a reimbursement of their cost; whilst on the other hand, it is just as apparent, that the charge imposed by the additional horses, will form an expense not only heavy and permanent,

but quite unredeemable by any such means as those just alluded to.

(Signed) G. Conran, Major, Madras H. A.

(Signed) R. Seton, Captain, Madras H. A.

11*th January* 1837.

In obedience to the orders of Government, the Board have submitted this statement prepared by the Members from the Madras Presidency, and supported by their view of its advantages; but in presenting this document, the Board are desirous that it should be clearly understood, that they by no means recommend its adoption.

On the contrary, they are firmly persuaded, that a troop of which the draft is exclusively composed of Horses, would on any real emergency, prove greatly superior in point of efficiency, to the mixed troop; while no doubt remains in their minds, of the inadequacy of the number of 185 horses, for a troop of Horse Artillery, with 14 carriages, and 130 men; the fact of the proposed arrangement with bullocks, being even economical, has not to their conviction been established; for it is assumed, that the bullocks must constantly be maintained by the state, to meet the calls of the troop, a condition which appears to them unvoidable on the Madras plan.

The Board, to enable Government to form an opinion on the efficiency of the two formations now submitted; beg to observe, that the troop as proposed on the Madras system, is calculated generally to draw the guns only by horses, but in extraordinary occasions, will only be capable of bringing on 6 guns and 3 waggons, or 9 carriages, with horses; when the troop first proposed, will bring on 6 guns and 6 waggons, 1 forge, and 1 spare carriage, or 14 carriages, with an equal proportion of spare horses.

The alleged advantages of the Madras troop then, are founded, the Board conceive, in substituting 60 bullocks for 25 horses, by commonly having all their waggons subject to the delays of bullock draft, and in cases of importance, leaving behind half its ammunition waggons.

Even was the saving considerable, the Board cannot deem this an advantage, but they question the saving of expense, and certainly contemplate no saving commensurate with the sacrifice. The small proportion of one spare horse per carriage, appears to the Board, the consequence of calculating horses for cerriages in which they are hardly ever used, but generally having a double set to work, while in the first troop, a half set only is estimated.

In regard to the capabilities of the Bullocks, the Board consider their determination regarding the Foot Field Batteries, to be a sufficient explanation of their reasons, for differing in the conclusion arrived at by the Madras Members.

The Madras Members submit a minute marked B in appendix, on which the Board have recorded their observations.

Captain Seton submits two minutes marked C and D in appendix.

(Signed) J. Stevenson, Lieut. Col. President.
J. Tennant, Lieut. Col.
C. Graham, Major Horse Arty.
W. T. Whitlie, Bt. Captain Horse Arty.

24th January 1837.

The Board recommend, that troops or batteries of Horse Artillery proceeding on service beyond seas, should be completed to 150 men, and 230 Horses; and that companies of Foot Artillery with field batteries, should be completed to the establishment proposed, of 104 men, and 100 Horses.

6	Guns at 6 each	36
6	Waggons at 6 each	36
2	Staff Serjeants	2
2	Buglers or Trumpeters	2
	Spare 2 per carriage	24
	Total	100

The battery with its men and horses, to be always formed in 3 divisions, each under the command of an Officer, equally in the Horse, as in the Foot Artillery.

The Board recommend, that the principles of the Royal Horse Artillery exercise, should be adopted, as far as it can be reconciled with that of the Foot Artillery, which they have already approved, and think to be more explicit. With this aim, it should undergo revision to correct differences which now exist between the two, and to meet the differences of organization of the Indian Horse Artillery ; but the Board are not capable of determining the alterations which are necessary, without the aid of a troop of Horse Artillery accustomed to detachment movements.

The Board are of opinion, that whatever exercise may be adopted, should be drawn out for both the Horse and Foot Artillery, by an individual of each of these branches conjointly, and be submitted to committees after it is framed.

The Board have had brought under their consideration, an alteration in the principle of attaching the breechings to the collar bar, as exhibited by Captain Robarts, Bengal Horse Artillery, on the 23d Instant, which they are of opinion is a great improvement. The mode of effecting this may be left for further experiment. The increased command over the carriage, which this method of applying the breeching gave to the wheelers, was very satisfactorily displayed to the Board.

In concluding the report on the Horse Artillery, the Board recommend as a point of convenience to the service, that the Trumpeters and Farriers should be clothed in the same manner as the Gunners of the troop, with appropriate distinguishing marks on the arm, instead of being clothed in red as at present.

The Madras Members submit a minute marked E in appendix.

Lieutenant Colonel Stevenson, Bombay Horse Artillery, submits a minute on pole and shaft draft, marked F in appendix.

Signed
J. Stevenson, Lieut. Col. President.
J. Tennant, Lieut. Colonel.
C. Graham, Major H. A.
G. Conran, Major H. A
R. S. Seton, Captain H. A.
W. T. Whitlie, Bt. Captain H. A.

APPENDIX A.

Minute by Colonel Whish, 21st September, 1836.

As it is possible that the establishment of a Troop of Horse Artillery, may again come under the Board's consideration, I beg to record my sentiments in this way, with a request that this minute may accompany any further report on this important point. After the discussions that have taken place, and the results that have been submitted in detail to the Supreme Government, it will only be necessary to notice under the general heads of "Men and Cattle," what I wish to enter as my final opinion.

Men.

We have generally agreed as to the number necessary, namely about 130, and I strongly advocate its being equally applicable to European and Native Troops, but the latter *in* Bengal, will I am confident, be better without the three European Serjeants (extra to the two Staff Serjeants) attached to Native Troops of Horse Artillery at Madras.

I cannot urge as indispensable, the keeping up a Syce to every Horse in Cantonment; a reduction of 1-4th in Cantonments which is about the proportion suggested by my Colleagues, may be practicable without detriment, except perhaps at the frontier Infantry Stations of Loodianah, where Syces cannot be procurable on any sudden emergency, as occurred a few months ago.

We have never had Troop Quarter Master's (Warrant Officers) in Bengal, and I therefore cannot say they are requisite for us, but I think two important advantages might be calculated upon, now that we have only two Subaltern Officers effective per Troop, and the generally steady behaviour of our non-Commissioned Officers makes promotion very slow. Their prospects and the respectability of the Corps at large, would be improved by such an incentive to good conduct, as also the efficiency of each Troop, which can never now afford a Commissioned Officer for the important charge of the line of waggons.

Cattle.

I will close these remarks with a specification of the lowest number of Cattle, that appears to me to be adequate in either system for a Troop of,

5	6 Pounders......	With Horses.
1	12 Pdr. Howitzer .	
6	Waggons......	
1	Spare Carriage .	
1	Forge Cart	
1	Spare Waggon .	With Bullocks.
1	Store Cart......	
16	Carriages exclusive of the Quarter Master's Cart, allowed in Bengal when marching.	

Proceeding upon the one principle, of allowing two horses to each rider in draft, of Guns and Waggons, (which is I believe not at variance with the mode of calculation adopted by our Bombay Colleagues) we shall have.

	Bengal System		Detachment System.	
	Horses	Bullocks.	Horses	Bullocks.
6 Guns, with 6 riders 2 horses to each, or 12 per Gun for Bengal; and 3 riders at 2 horses each, and 3 off horses or 9 per gun detachment system..........	72	0	54	0
6 Waggons do. do.	72	0	54	0
6 Detachments of 10, excluding the Serjeants who are in the following line, and allowing 10 spare......................	0	0	60	0
2 Staff Serjeants 6 Serjeants 1 Drill Corporal 2 Rough Riders 3 Trumpeters 2 Farriers 1 Native Doctor 1 Native Farrier 18 Serjeants, Trumpeters, Rough Riders &c.	18	0	18	0
For 12 fighting Carriages and detail......	162	0	186	0
Spare Carriage....	5	0	5	0
Forge Cart...............	5	0	5	0
	172	0	196	0
Spare Waggon (in the Field)...............	0	7	0	7
Store Cart in Cantonments, and in the Field	0	7	0	7
Total......	172	14	196	14

I do not recollect (in Bengal) an occasion on service, where Bullocks would have been expedient aid for the draft of the Ist line of Waggons, but I would particularly notice one where they were detrimental.

Shortly after returning from the Campaign of 1817-18, a force under General Sir J. Arnold, K. C. B. took the Field in the Bhattee country, a very sandy soil, but less felt as it was the rainy season; the force consisted of a Regiment of Cavalry, about 3000 Bayonets, a Troop of Horse Artillery and Rocket cars. In reference sometimes to the enemy, and sometimes to the danger of being without water, we occasionally made marches far exceeding 20 miles, in which Bullocks could have been of no use whatever, but must have proved a clog to the movements of the force. I trust therefore, that should the Board be called upon eventually, to fix upon an establishment for a Troop on the Detachment System, that the number of horses (by whatever mode of calculation adopted) may approximate with the above, and I encourage this hope the more, as our Madras Colleagues in their original detail, noticed, that without the Bullocks a considerable increased proportion of spare horses would be required, and 196 (with 14 out of 16 Carriages horsed) only exceed 185 by 11.

(Signed) W. S. Whish.

Appendix B.

MINUTE BY THE MADRAS MEMBERS.

23d January 1837.

Though we have affixed our signatures to the proceedings on the question, of the merits of the two Systems of Horse Artillery referred, yet we feel bound however reluctantly, to enter our dissent from many of the views and opinions therein recorded.

We shall refrain from entering into any minute detail of our reasons, as the points whence they arise have already been so much mooted, and the discussions thereon have become so lengthened, and have assumed such a degree of prolixity, as to render it a matter of apprehension, even now, that they may be found very complicated to those on whom an ultimate decision rests.

Without by any means admitting generally, the alleged disadvantages that are urged against the employment of Bullocks, in the mode proposed by the Madras Members, we would only request, that any, or all of them, may be deliberately weighed, and compared with the experienced advantages arising from the preservation of the general efficiency of the draft horses, to which the system so remarkably and essentially contributes.

Main stress is laid on the impracticability the System is said to involve, of having all the Waggons at all times up along with the Troop. Giving full force to this objection, we remark, that it is of far more importance to consider, how far the operation of either system is calculated to ensure a capability of the Troop (Guns as well as Waggons) to undergo a continuance of hard marching.

If any doubt exists as to the means of getting on the Guns, in cases of great and continued exertion, the consideration of a part, or whole of the Waggons, becomes clearly one of very minor importance, and it is precisely on this very point, that we feel the strongest doubt, and on which, the question almost entirely hinges. We entertain the strongest conviction, that in a Troop on the system and establishment now proposed, unaided by Bullocks, in the course of any active service at all protracted, its means of movement would become so cramped by an impaired condition of its horses, as well as from incidental casualties and accidents, as we are persuaded would fully justify all we have urged in regard to the important benefits derivable from the aid of Bullocks.

It should be steadily kept in view, that the question at issue, is not an abstract one of how far it may be desirable, that horses *only* should be admitted into the constitution of a Horse Artillery Troop; but one on which a judgment must be formed with reference to many important considerations; expediency must be consulted, and expense must be estimated, and this the Committee has most sensibly had to feel, in drawing out its establishment of a Troop; and the necessity it has laboured under of fixing it on the most limited scale, at all compatible with efficiency.

We are fully aware, that 210 Horses for a six Gun Troop, is as large a permanent establishment, as could well be asked for, though we are not by any means free from apprehension, that it may be found inadequate, and certainly much less equal to trials of an extraordinary nature, than the other one aided by Bullocks, with only 185 Horses.

We consider the efficiency of a Troop on an establishment of 210 Horses merely, and unaided by Bullocks for the Waggons, as highly doubtful, and as little more than a matter of conjecture, and that the decision of the point, must await the means of proof, which are only to be derived from the employment of a Troop so constituted, on some service of a trying description.

Under such impressions it cannot be a matter of surprise, that we should persist in withholding our assent to such a system, in preference to one which has already undergone a long series of the most severe trials, and of the efficiency of which, we besides ground a conviction on our own experience.

As to the economy of the system in which Bullocks are partially admitted, we apprehend there can be very little, if indeed any doubt, and although we should not be at all disposed to give any undue weight to this consideration, if opposed in the least to the much more momentous one of efficiency, yet when we labour under a firm conviction, that it would be not only uncompromised, but promoted greatly, by the adoption of the system we recommend ; in that view, the consideration becomes of high importance, and it becomes our duty to urge attention to it.

Signed { G. CONRAN, Major, *Madras Horse Artily.*
{ R. S. SETON, Captain, *Madras Horse Artily.*

FORT WILLIAM, 23*rd January* 1837.

Observations by the Board, on the foregoing Minute.

In reply to the observations contained in the minutes of the Madras Members, regarding the use of Bullocks to the waggons, or in other words, to having a different power of moving their first line, to what is proposed for the 2d line; the Board have adopted that opinion, which appears to them to be the best established, neither do they rest their opinion on the experience of Indian service only, but conceive it as a general principle, which cannot be abandoned without great danger to the usefulness of a Troop.

In this they are confirmed by the following observations of the Royal Artillery Committee, being the result of extensive experience, gained, not exclusively in the late Peninsula Campaign, but also in those on the Continent at the commencement of the previous War.

" If a difference of Horses be proposed, between the Car-
" riages which go into the first line in the field, and those
" for its immediate supply or general utility, that is, be-
" tween the Gun and one waggon to each, and the remain-
" ing Ammunition and other Carriages, it is consider-
" ed that a nominal, and not a real saving would be made,
" from the overwork thrown on the latter Carriages, caus-
" ing very shortly, greater expenditure of the Horses than
" might otherwise be expected ; for in allotting Horses to a
" Battery, the best are of course placed to the Guns and
" Ammunition waggons in first line, the next best to the
" spare Ammunition, and the remainder to the Forge and
" spare Carriages."

" The Carriages in the first line must be at all times
" kept complete, and what cannot be supplied from the
" spare, must be from some of the rear Carriages. The
" consequence is, that the rear Carriages (and more espe-
" cially those which do not convey Ammunition,) become
" weakened from the draft in the course of the Campaign,
" and unable to perform the duties required of them."

" If it be urged, that the rear Carriages are not always
" close up with the operating part of the Army, and by tra-
" velling great roads, are not liable to so much fatigue, and
" therefore do not require so full an equipment ; the an-
" swer is, that the Ammunition Carriages must always be
" at hand in the day of action, though in the rear, must
" consequently in great measure travel over the same ground,
" and must be capable of full exertion in conveying the
" Ammunition when called for. They are otherwise of no
" use. The opportunity is lost. The Gun is without Am-
" munition, and may even be in danger after expending its
" stores, before a supply can be got up."

" But the march of an Army is not always made by great

" roads, but frequently by such as are marked out by the " Quarter Master General's Department, across the coun- " try. Here the weaker Carriages by being in the rear " suffer most, what was at first perhaps a bad road, becomes " a slough, and where the first Carriages well horsed, get " through without much difficulty, becomes perhaps impas- " sable for those in the rear, without the aid of each others " leaders, thereby causing delay, overwork of the Horses, " and consequent expenditure of them."

Neither can the Board admit, that the results to be expected with 210 Horses, are mere matter of conjecture. The Board observes, that a Bengal Troop with Lord Lake, when supplied with one set of draft Horses, and a proportion of spare draft, equal to one half more for all Carriages, is recorded by his Lordship, in his dispatch 18th November 1804, to have marched for 27 days at the rate of 24 or 25 miles a day, to have finished with a march of 58 miles, and to have been first up in action; and after a day's halt, to have marched afterwards from Futty Ghur to Muttra.

In further corroboration of the capability of a Troop with Horse draft only, the Board would advert to the effort made by Captain Rodber, Bengal Horse Artillery, with a newly formed Troop, composed of the gallopers of the 5th and 6th Regiments of Cavalry in April 1818, with 79 Horses (of which 11 were required for the Native Commissioned and Non-Commissioned Officers and Staff) 4 Guns and 4 waggons, he made a march of 12 hours from Nagpore, and joined the Camp of Colonel Adams with whose force he moved again after 6 hours rest, and continued marching, fighting, and in pursuit of the enemy for 14 consecutive hours; having in the space of 30 hours with 8½ draft horses per Carriage, compassed from 90 to 100 miles, without leaving a single Carriage in the rear; while they observe, that a light Detachment under Colonel Doveton 1818, with which there was a Troop of Madras Horse Artillery, with only one waggon for 2 Guns, marched 100 miles in four days, when the Detachment was obliged to halt from the exhaustion of the Horses.

It is to be observed that the Troop now proposed, gives less labor to the Horses than the Bengal Troop in 1804 did, inasmuch as half the drivers are now carried in Detachment, which then rode the draft horses; nor in the

Bombay Presidency can it by any means be conceded, that the capabilities of the proportion of Horses demanded, rest upon conjecture, since on all occasions that Troops have had their proper complement founded on this basis, they have marched with the Troops they have been acting with, accompanied by their full proportion of Ammunition.

The foregoing facts satisfactorily establish in the minds of the Board, the correctness of the data adopted by them, to determine the number of Horses actually required for a Troop in India, and forcibly exhibit the inefficiency, for active service, of a Troop organized with a smaller proportion of spare Horses than that proposed by the Board, in consideration of any relief, which Horses in a reduced establishment may derive in ordinary marches from Bullocks; for it is admitted by the Madras Members, that upon the reduced scale they have proposed, even when waggons have been horsed, it has hitherto been customary to take only one half of the number with the Guns, thus affording proof of the inadequacy of the establishment they recommend, for the draft of the 14 Carrriages allotted to a Troop.

Signed
J. Stevenson, *Lieutenant Colonel, President.*
J. Tennant, *Lieutenant Colonel, Bengal Arty.*
C. Graham, *Major, Horse Artillery.*
W. T. Whitlie, *Bt. Captain, Horse Artillery.*

Appendix C.

MINUTE BY CAPTAIN SETON MADRAS HORSE ARTILLERY, 20*th January* 1837.

Adverting to that part of the Committee's remarks, on the comparative efficiency of the Horse Artillery systems, wherein reference is made to its former proceedings condemning the use of Bullocks for the purpose of light Field Batteries; I would here beg to state, that on that question, my vote was in dissent to the opinion expressed by the Committee, although at the time I made no formal record of my sentiments on the subject.

The view I had then of the question is still unchanged, and

I am of opinion, that even if the desirableness, *abstractedly* considered, of the introduction of Horse draft into light Field Batteries were allowed, still there are opposed to it, so many and such very obvious reasons, arising out of expediency, as might at once be decisive of the point. Besides which, though the opinion of the Committee were admitted in its full force, it would not in my mind form an argument of any cogency or conclusiveness whatever, against the admission of Bullocks into the Horse Artillery system, in the manner now proposed ; and as has always been practised by that Corps at Madras.

There can be no difficulty in conceiving, that a description of cattle may be *unsuitable* to the *manœuvre* of Guns, which yet might be available and effective as an *aid*, in bringing up any portion of the Ammunition of a Battery.

(Signed) R. S. Seton, *Capt. Madras Horse Artillery.*

Appendix D.

MINUTE BY CAPTAIN SETON, MADRAS HORSE ARTILLERY.

Though most adverse to prolong the discussion on the different systems of organization of Horse Artillery Troops, I feel in duty bound to notice and explain a remark, which has been entered in a Minute by the Bengal and Bombay Members, because though so worded as to *bear* a more general construction, it most clearly implies a reference to the Horses of the Madras Horse Artillery in particular, and must be entered with a view to convey an impression to the disadvantage of that Corps, the remark is as follows ;

" They observe, that a light Detachment under Colonel " Doveton in 1818, with which there was a Troop of Ma- " dras Horse Artillery, with only one waggon per Gun, " marched 100 (106) miles in four days, and was obliged to " halt from the exhaustion of their Horses."

I served with Colonel Doveton's division and in the Horse Artillery, during the whole of his campaign against the Peishwah in 1818, (which on all hands was admitted to be a very active one) and I can without the least fear of contradiction, (and my statement if erroneous is susceptible of refutation by Colonel, now General Doveton himself at present at Madras,) assert, that in *no one* instance during the whole period of it, was he ever retarded, or constrained to slacken his rate of moving on account of the Horse Artillery. I have consequently too the means afforded by personal observation, of knowing the real circumstances of the case, to which the remark extracted from the minute above referred to alludes; and I can most positively affirm, that the horses of the Horse Artillery on that occasion, were not more exhausted than were those of *any* Regiment of Cavalry present. I feel conscious indeed, that I should be fully justified in saying that they were very much less so, but what I have said is sufficient for the present purpose, and resolves the question into one *generally* of the merits or otherwise then of the mounted branch of the Madras Army. The state will never have just reason to complain of the system of organization of its Horse Artillery, as fitting it for rapid movements or continued exertion, if in all cases it be found fully equal to cope with its Light Cavalry.

But it is to be observed, that conclusions drawn from any insulated facts, are at best but illusory, and that before an attempt even, can be made to ground any reasoning on them; it is absolutely necessary, that all attendant circumstances by which such facts may be influenced, should be known and properly estimated. It is quite clear, that when wheel carriages are concerned, no inference can be drawn from a comparison of mere distance travelled, the state and nature of the roads, with various other circumstances, may so differ, as to render a consideration of distance, within certain limits, one of very reduced importance. And here in reference to the quotation from the minutes of the Bengal and Bombay members, I have to observe that the roads over which the force moved on the occasion there alluded to, were *very* unfavourable, and the country through which it passed exceedingly difficult; that the march was made at the very height of the hot weather; that the force for a very considerable time immediately previous, had constant and hard marching; and that lastly and more particularly, the Cavalry and Horse Artillery had to accommodate their pace to that of the Infantry, which accompanied. The force marched for four successive nights with a company of Infantry heading the line of march, and the ordinary pace of the horses being thus checked, they became much more exhausted and jaded, from the mere *time* they were in motion and want of rest, than from the absolute distance moved over. It should be added too, that Colonel Blacker, (on whose memoir of the Mahratta War the Bengal and Bombay members ground their remarks) says nothing conveying the most distant implication of the state of the horses of the Horse Artillery, being in a worse state than those of the Cavalry, and he besides observes, that the men were reduced nearly to the same state, as the horses, and that it was likewise necessary to await the arrival of supplies with the rear division.

A perusal of the whole paragraph will convey a very different impression, from that obviously intended by the entry of the remark into the document whence I have extracted it, and that the exertion made on the occasion had not been one by any means of an ordinary description, as it goes on to state, " that his (the Peishwah's)" route was easily tracked, " by the number of exhausted and dying or dead cattle found " in the several villages" (he might have added all along the road to) " he" (Colonel Doveton) " passed."

In regard to the waggons, I remark that one per two guns drawn by bullocks, were left with the rear column as an arrangement of convenience, not as a matter of necessity ; and that as they rejoined the force in two days after it had been *necessitated* to halt, and were then in as fit a state, as the Cavalry or Horse Artillery to proceed in further pursuit of the enemy, and actually did so. The instance seems to me a very strong one indeed, in favor, rather than the disparagement of the system aided by bullocks.

But my present object is to afford necessary information and explanation on a particular event, when both seemed to me to be called for, and not further to advert to circumstances or particulars connected with it, than may be necessary to attain that object.

My conviction is firm as to the insufficiency of a few detached and unconnected facts, even if recorded and ever so well authenticated or minutely detailed, to afford grounds on which to reason on the preference due to any particular system of organization, because we know that in this country, the most extraordinary feats are constantly performed by bodies, the most completely devoid of any regular system whatever ; and this leads me to refrain from remarking on the others, advanced by the Bengal and Bombay members in their minute ; farther than to state, that they have no direct reference whatever to either of the two systems at present under immediate discussion. I cannot however help observing, that it does seem to me rather strange, (and to others it may have a similar appearance) to find the Bombay members advocating their present views, by advancing instances of extraordinary performances said to have been achieved by the Bengal Horse Artillery. under a system of organization, the inferiority and radical defects of which, they have throughout our previous discussions, most strenuously endeavoured to establish, as may be seen by a reference to the preceding parts of the record of our proceedings.

(Signed) R. S. SETON, Captain,

Madras Horse Artillery.

CALCUTTA, *25th Jan.* 1837.

OBSERVATIONS ON THE ABOVE MINUTE.

The Bombay members have been led into no inconsistency as assumed by Captain Seton, the particular point in which they differed with their Bengal colleagues, referred to the mode of carrying men on off draft horses, and on this their opinions remain unchanged, the instance of services rendered by the Bengal Horse Artillery advanced by the Bengal (not Bombay) members, are matters of historical record.

(Signed) { J. STEVENSON, Lieut.-Colonel.
W. T. WHITLIE, Bt. Capt., *Horse Art.*

APPENDIX E.

MINUTE BY THE MADRAS MEMBERS, ON THE SUBJECT OF TROOP ADJUTANTS, AND TROOP QUARTER MASTERS, AND SERJEANTS TO NATIVE TROOPS.

It having been decided by the majority of the Committee, that Troop Adjutants and Troop Quarter Masters, should not be included in the establishment of a Horse Artillery Troop, we (the Madras Members) beg to enter our dissent to this arrangement. We think, as regards the former, that the duties connected with a Troop are so various and extensive, that the Commanding Officer of any one, or of any number of Troops of the same Brigade, when together and detached from its Head Quarters, should have the aid of an Adjutant on such salary as may be fixed.

With regard to the Troop Quarter Masters, (Warrant Officers) the rank has always existed in the Madras Horse Artillery, and has been found to contribute most essentially to efficiency in all situations. In cantonment, his duties consist chiefly in a general superintendence of the Horse Lines, Gram, and Forage, with a general control over the Horse-keepers, and Grass-cutters. In the field, in addition to these, it is his duty to proceed in advance, to procure a supply of forage for the Troop, on its arrival at the new ground of encampment. This rank for a long time formed part of the establishment of a Bombay Troop, and the Members of that Presidency fully admit his utility, but has never entered into that of a Bengal one and there perhaps, he may not be quite so indispensable ; as in that Presidency, whilst in cantonments, the Horses remain under stabling, and in consequence there are then no horse lines to take care of.

We have inserted him in our proposed Establishment of a Troop on the Madras system, because we consider him as nearly indispensable, not however on that system particularly, but on any other that may be decided on. We would also take this opportunity of mentioning, that in the Native Troops of the Madras Presidency, a Serjeant to each two Guns has always formed part of the establishment, and that they have been found extremely useful, in looking after the Ordnance, Ammunition and Harness. These have never existed in Bengal, and are not admitted by the Committee.

In conclusion, we beg to express a hope, that as these ranks and appointments exist at Madras, and that as their abolition there would be felt as a very great loss, they may at least be permitted to continue with Troops at that Presidency.

(Signed) { G. Conran, Major M. H. A.
R. S. Seton, Captain M. H. A. }

Appendix F.

MINUTE ON POLE AND SHAFT DRAFT BY LIEUT. COLONEL STEVENSON BOMBAY HORSE ARTILLERY.

There is perhaps no question upon which Artillery Officers in Europe, and in India, are so much divided ; as that relative to the best mode of drawing Artillery Carriages by Horses. I beg therefore to avail myself of the permission given in Colonel Casement's letter of the 30th May last, to place on record, the grounds upon which my suggestion, for the retention of the means of both modes of pole and shaft draft were offered—a suggestion most readily concurred in by the Board, and recommended in our proceedings to the Supreme Government for continuance,* as not affecting the general assimilation of the materiel of Field Artillery, while it afforded additional facility of draft in every variety of country, an object which the French have considered of sufficient importance to provide for. For although the pole appears to be in general use with them, it is not exclusively so, but their Artillery carriages are rendered capable of shaft draft also.

That the system of pole draft should have been recommended, by the majority of the Board, is not surprizing, considering that, that system is in use under the Presidencies of Bengal and Madras ; but in neither has the English shaft system, I believe, ever been put to the test of fair, and impartial trial, (it is moreover to be considered, that the adoption of the shaft would have deprived the former Corps of a Gunner for the service of the Gun, carried on the off pole horse) but I will hereafter shew, that the

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* Vide page 10.

English shaft draft, has not only stood the extensive and varied experience of the Royal Artillery, but that its superiority for general service, has been maintained by the Officers of that arm, whilst its merits have been advocated by many distinguished Officers of the French Artillery, who acknowledge that "the English limber" (now in general use in India) "with its system of draft, completely obviates the "difficulty of the question formerly experienced, that the "equipoise of these peculiarly constructed shafts, gives it at "once the advantages of the pole and shafts, and this in the "simplest manner ; having all the facility of motion, which "the French were desirous of giving to their heavy and "cumbrous ones This system of draft, is pronounced by "Parizot," (one of the most skilful Artillery Officers in France) "to be excellent, and the complete solution of "the problem proposed in the Aide Memoire of General "Gassendie."

Having earnestly endeavoured to obtain every information on the subject, the only recorded objections which I have met with, to the use of shafts, bear reference to the "Thill shafts" of the French carriages of Gribeauval, or such as are formed of two side bars and a cross bar, all three united forming an unwieldy and ponderous article, attached by means of hooks to the axletree of the limber (working as it were upon hinges) having low front wheels not exceeding 3½ feet diameter, the insufficient height of which, rendered the line of draught from the Axletree to the point of the horse's shoulder oblique, causing much annoyance and distress to the animal, in any but smooth ground, from the action of the shafts against his legs, about that part called the Gaskins ; this description of shaft appears moreover, to have admitted of draft in single file only, and when, with these circumstances, is taken into consideration, that the traces of the horses in front were attached to the end of the shaft (drawing downwards) which as before stated, had a direction obliquely upwards, it will not be wondered at, that the French complained of shaft horses being knocked about, pulled down, and injured by such mode of draft.

It is to these heavy and cumbrous shafts, adapted to single team only, most distressing to the Horses, constructed in the form of those in use at the present day, in domestic single horse carriages ; that the objection of all Foreign Officers, and writers on the subject, have been directed. The inapplicability of their arguments to the British shaft, will be the more apparent, when it is known that they urged the difficulty and almost impossibility of moving their carriages with shafts *at a Trot!*, and in no work can I discover any objection to the description of shaft, in use with the Royal Artillery.

English shafts attached to our present carriages with high front wheels, and the mode of connecting the traces of the leading horses to those of the rear, are free from the foregoing evils. These shafts are composed of two separate side bars only, not joined together, either of these can readily be replaced if injured; and by a simple alteration of position, can be adapted for a single file of horses in a narrow pass, where there may not be foothold for a pair; or for three horses abreast in deep sand or swampy ground, a mode of concentrating the power of horses of no minor consideration in such difficulties; particularly if their strength has been impaired by long marches, a scarcity of forage or water, or any other contingency of war; moreover two shafts having no force acting upon their extreme ends are not so liable to break as one pole, which has to sustain every shock of the carriage in rough roads, to check its progress in descents, and on all occasions of pulling up, or halting from a rapid pace; the whole power in these cases, being exerted at the extreme point of the pole, in front of the wheel horses.

Some officers have assumed, that all quick moving vehicles should have poles; all slow moving equipages shafts. I apprehend however such opinions to be crude, and formed on the customary modes of draft relatively applied to Mail Coaches, Travelling carriages, and Waggons, all having low front wheels; but here also it is to be considered, that the poles of all these carriages are supported, causing no weight whatever on the necks of the pole horses; whereas in Artillery carriages, the pole if not supported on the horses necks, or by means of a sweepbar acting under the trail of the carriage, (a mode some time since abandoned) would fall to the ground. However desirable therefore this difference in the mode of drafting carriages may have been found in England, on the finest roads in the world, its applicability to Artillery carriages required to traverse countries of every feature, as in warfare over bad roads, or perhaps where there may be none at all, will I conceive be deemed not so conclusive: with regard to the celerity of movement, of which Artillery carriages with shafts are capable, it is merely necessary to advert to the fact, that the Royal Horse Artillery have always been found able to accompany Cavalry without retarding them, and it is as well to add, that *Dupin* mentions "the admiration with which the French "Officers were impressed, of the perfection of the British "system, when contrasted with those of other Nations "assembled at Paris in 1815, surmounting obstacles with "the utmost facility, which would have required much time "and labour by the French." It will be remembered the British had shafts, and the other Nations poles on that occasion!

At first sight, it might appear, that from both pole horses being attached to the pole, their united efforts to retard a carriage in descents, or to stop it when ordered to halt, would be greater than the power exerted by a horse in shafts, but this to my mind is illusory; the power exerted by pole horses, acts immediately upon their necks, thus the whole weight of the load is entirely dependant on the *Hames Strap*, which in measure is about *three quarters of an inch broad, and little more than a quarter of an inch thick!* the weight of the horses acts but little upon the carriage, and the principal use of the breechings appears to be, in preventing the bottom of the collars from striking the lower jaw; and the collar in fact from choking the horse, whereas in shaft draft, the breechings are attached to the shaft, the whole weight and power of the horse acts directly upon the carriage, and there is no bearing down weight, or force acting on the neck and before his shoulders.

In case of a shaft horse falling, the weight he has to sustain in recovering himself, is on his back, and behind his shoulders, there is nothing before him to impede the free use of his forehand and legs, and he can put forth his whole muscular power to extricate himself from difficulties.

A pole horse, besides the constant weight upon his neck, is by the collar bar prevented from throwing forward his fore legs in case of falling, and I believe it is not an unfrequent occurrence, that on such occasions, he is obliged to be released from the carriage, and put to again, before the carriage can proceed. The breaking of hames straps also, from the constant heavy stress upon them is of frequent occurrence. Ever since poles have been used in Artillery carriages, methods of supporting the pole have been constantly devised, but I apprehend the defects inherent in the mode, are absolutely beyond remedy ; so long as any weight is to be sustained on the neck of a pole horse, a position in front, so far removed from his centre of gravity ; and although Lieut. General Alix, reprobates the mode adopted by the French, in their new system of Artillery, for supporting the pole on the horses necks in supercession of the sassoire, or rear sweepbar, acting under the trail of the carriage, yet still I am inclined to think, that the collar bar affords the least objectionable of these two means of support, for if the pole were supported by pole chains only, as some advocate, the pole horses being drawn to a central point would work with their shoulders inclined inwards, and not direct to their front ; and besides the galling of their withers and necks, which must ever be attendant on pole draft, from the incessant weight on the horses necks, and rubbing of the collars from the constant action of the pole, would also render them more liable to chafes and strains.

The pole of the established light field limber, appears to be as well balanced as can be, but the weight of the ferrule, collar bar, and connecting chain, divided between the two horses, added to the weight of the collar and hames complete, will be about 42℔. or 3 stone upon each horse's neck, a weight of consideration, when carried so much in front of the centre of gravity.

That pole draft, may still be considered imperfect, I may also be permitted to infer, from the numerous proposals which have been made by those who have used them, to remove alleged defects. The proceedings of the Select Committee of Artillery Officers at Madras, afford ample proof of the inconveniences which have been experienced; and even during our sittings, in adopting the Bengal collar bar, an addition has been made to it, taken from the Madras pattern, besides which, the Board has had under consideration a proposition submitted by Captain Roberts of the Bengal Horse Artillery, that has for its object, the connection of the breechings with the collar bar, and which appears to me a decided advantage.

The British Shafts are of that simple construction, that I am not aware of a single suggestion having been offered during their long period of use, for any change or improvement in them ; poles were in use with the Bombay Horse

Artillery for the first five years subsequent to the raising of that Corps, or 'till 1816, when shafts were adopted, and have ever since continued in use, without any alteration in the original plan, or without any complaints regarding them.

Shafts were laid aside and Poles were brought into use by the Royal Artillery from 1795 to 1800, but in the latter year Shafts were reverted to, and have ever since been continued.

During this long period, as great a field doubtless was offered, for ascertaining the merits or defects of this mode of draft, as can ever occur again in warfare; but as it is well known that British Officers (those of the Ordnance in particular) have ever been ready to appreciate the scientific attainments of other Nations, and have never hesitated to recommend the introduction into our Military System, of that which is really useful, it may reasonably be believed, that the Committee of distinguished Officers appointed to make a revision of the several .equipments in the Royal Artillery Service in 1819, would have recommended the re-adoption of Poles, had such a mode of draft been by them considered in any way preferable to the one in use.

Lieut General Cotty in his "Supplement au Dictionnaire de L'artillerie" published in 1832, in allusion to the Shaft in use with the British Artillery, says, "This species of Shaft was "proposed in 1827 by M. St. General D'Authonard, and "the trial that was made in a march of great extent, con-"vinced many Officers that it combined the greatest possible "advantages, with the least possible inconvenience!"

Upon the whole then it occurs to me, that the system of pole draft is much more complicated than that of shaft, and that pole horses, are liable to much more annoyance, and wear and tear, than those working in shafts.

I have never been averse to the trial of Pole draft, on the contrary, whilst in command of a Troop in 1828, I made special application for permission to try it, and may add, that at the period of my nomination for the discharge of my present duties, I had it in contemplation to solicit the permission of the Bombay authorities, to have half the Guns of each Troop equipped with Poles and Shafts, so that the trial might be simultaneously carried on, with a view to the selection of the best System.

From what has been stated, I trust it will be apparent, that the question of the relative merits of the two modes of draft, is one upon which the opinions of Artillery Officers in Europe and in India, are not satisfactorily determined; and that I may be permitted to hope, that as the recommendation of the Board for the continuance of the means of adopting either mode of draft, according to the nature of the country in which Troops may be employed, will not affect the general assimilation desired in the Artillery carriages throughout the three Presidencies; that, that recommendation will receive the favorable consideration of the Supreme Government, as furnishing additional means to ensure the efficiency of their Horse Artillery in India.

Since writing the foregoing, an opportunity has been afforded me of ascertaining the weight required to poise the Pole, with the collar bar, linking chains, and ferrule attached, and also the weight required to poise the Royal pattern Shafts. The limber in both instances being loaded with Ammunition, and the boxes being stowed and placed as proposed in our proceedings. Fifty six Pounds was the weight required in both cases, a near pole horse therefore, in addition to his rider, carries including the weight of collar and hames, no less than 42 pounds or 3 stone on his neck, the off pole horse has also 3 stone on his neck.

Such heavy weights so far removed from his centre of gravity, must destroy the equilibrium of the horse, and be most distressing and ruinous in its effects.

It is true, that the wheelers in Shaft draft have their collars to carry, but there is no bearing down weight constantly acting upon their necks, as in Pole draft; on the contrary, when their traces are stretched, the neck of the animal is relieved from a portion of the weight of the collar, which he bears when halted. The weight of the Shaft has been stated the same as required to equipoise the Pole, 56 pounds, but this is carried on the back of the Off horse. The question of relative merits of Pole and Shaft draft, would appear then, to offer the following as a problem for Solution.

Can two Pole horses, one carrying 16 Stone on his back, and both 3 Stone each on his neck, requiring a constant and severe exertion of the muscles of the forehand, work with as much ease and effect; as two wheel horses, one carrying the Shafts (4 Stone) on his back, and the other a rider (16 Stone) both horses deriving relief from the altered position of the collar when in draft?

If the question had reference merely to the *ease* of the Pole horses, I conceive that the old French mode of supporting the pole by a Sweepbar, acting under the trail of the carriage, would have the preference; but this would be pregnant with serious evils, such as difficulty of limbering up, and unlimbering, and a want of Ammunition at hand for immediate use, all of which the limber at present in use, was introduced to obviate.

Under all circumstances then, I am led to conclude, that the Royal pattern Shafts as in use at Bombay, afford in every respect, the most desirable means of supporting the weight of the Limber of Artillery Carriages.

(Signed) J. Stevenson, *Lieut. Colonel,*
Bombay Horse Artillery.

(True Copies.)

(Signed) J. Stuart, *Lieut. Colonel,*
Offg. Secy. to the Government of India,
Military Department.

FROM THE BOARD OF ARTILLERY OFFICERS OF THE THREE PRESIDENCIES,

To,

COLONEL CASEMENT, C. B.

Secretary to the Government of India,
Military Department.

Sir,—We have the honor of transmitting to you, our report on the Horse Artillery Harness, manufactured by Messrs. Teil and Co. of Calcutta; and to which report certain minutes are appended, stating objections to the adoption of the Madras Pattern Harness, for the general service of Horse Artillery in India.

(Signed)
J. STEVENSON, Lieut.-Col. H. A. President.
J. TENNANT, Lieut.-Col. Artillery.
C. GRAHAM, Major.
G. CONRAN, Major.
R. S. SETON, Captain.
WM. WHITLIE, Bt. Captain.

FORT WILLIAM, 13*th February*, 1837.

(True Copy)

(Signed) J. STUART, Lieut.-Col.,
Offg. Secy. to the Govt. of India,
Military Department.

FORT WILLIAM, 31*st January*, 1837.

The Board assembled at Dum Dum on the 23rd January, expressly to inspect the Harness of the several Presidencies, and the sets prepared by Mr. Teil, upon the Horses of the Troop at that Station.

They found the materials and workmanship of Mr. Teil's Harness very good, indeed superior to the muster Madras Pattern ; but the collars were considerably too small, both in width and depth for the Bengal Horses ; and these with other portions of this Harness, did not strictly correspond with the muster furnished. The sit of the breeching was particularly faulty.

The Bombay members originally objected to the adoption of the Madras Pattern Harness, for the Horse Artillery in India ; and they now submit a minute of their reasons for dissent (marked A in the Appendix) in which Major Graham also concurs.

A minute (marked B) by Major Tennant on the same subject is also appended.

(Signed)
J. STEVENSON, Lieut.-Col. H. A. President.
J. TENNANT, Lieut.-Col. H. A.
C. GRAHAM, Major H. A.
G. CONRAN, Major H. A.
R. S. SETON, Captain H. A.
W. WHITLIE, Bt. Captain H. A.

APPENDIX A.

MINUTE BY THE BOMBAY MEMBERS.

The Bombay members having been over-ruled by a majority of votes, in the original recommendation to Government of the Madras Pattern Harness, for the general service of the Horse Artillery in India ;* feel themselves called upon to enter distinctly their reasons for their original dissent, now that the completion of the harness ordered to be made up under the instructions of the Board, is to be reported to Government.

Off Pad.—The cantle of these Pads rises abruptly and is so high, as to render it liable to be wrenched or broken off, by any common accident, such as a trace getting over a horse's back. The hip straps passing over the ridge of the back, are more liable to chafe, than the mode of supporting the trace, in the Bengal and Bombay harness. Neither the *size* nor *form* of these Pads, are adapted for the carriage of the gunners valisse, fixed by the Board which pattern is the same as in use with the mounted Corps of the British Army.

Traces.—The Traces are covered with leather and both are fastened together, this when perfectly new gives a neat appearance, but the leather covering is objectionable, the trace being made of tarred rope, and from this covering is rendered stiff, and cannot be coiled, or lapped, or disposed of so conveniently or snugly, on led draft horses, as the trace in use in Bengal or Bombay, which is pliable, having a pipe of leather to about half its length only. The ropes of new traces stretch with work, so must the leather covering, the latter is liable to shrink from atmospheric influence; in either case it must crack, for it cannot be supposed that these two materials distend and contract equally at all times. These traces have their hooks and links fastened to the rope, by means of three iron rivets, passing through the rope, and two plates at each end. The rivets and plates are of course liable to corrosion, and the rope consequently to destruction ; another objection to this mode of attaching the hook, is the difficulty of regulating the length of trace. The services of a Smith and a Moochie being necessary to cut the rivets, and to refasten new ones, and to remove and replace the leather covering ; whereas the trace hook at the other Presidencies is simply fixed by splicing, and can be altered by any of the gunners, without such assistance, as new traces stretch by use, ready means of regulating their length is of consequence.

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* Vide Page 16.

Breechings.—The Madras Breeching is a complicated and cumbrous article, the strap on which the horse seats himself is neither so broad, nor does the breeching with its component parts lie so smoothly, as in the Europe pattern in use at the other Presidencies. To afford the requisite strength to the Madras breeching, two pieces of rope covered with leather are laid over the seat. As rope and leather do not yield and contract in like proportions, this breeching is more liable to wrinkle, and chafe the horse than the other.

The iron crank on each side, which serves to connect the seat of the breeching, and the straps that are attached to the collar hames, are of a form in the Madras harness, which are more likely to turn and cut a horse, than the simple one of the Europe pattern in the Bengal and Bombay breechings.

The strap which connects the breeching with the collar hames, has in the Madras pattern *three* folds or layers, whereas in the other harness, the same strap has only *two.*

Collars.—Are closed at top and fastened together: this is objectionable, as if a little tight for a horse he cannot be eased as when open, by letting out a hole or two in the hames strap; besides which, there are no means of taking the collar on or off, without forcing them over the horse's head. Young horses, and many old ones will not submit readily to this. The collar hames have the rings for the pole bar and linking chain so attached, that they cannot be used for near and off horses indiscriminately, but the harness must be used on the particular side for which specifically made.

Snake Hooks.—There are too many of these in the Madras harness, although their substitution in lieu of the rear trace hook is a decided improvement; no less than three snake hooks are attached to the hames on each side of the wheel horse. The consequence is, that neither the traces nor the breechings of the wheel horse, lie so snugly as in the Bengal and Bombay harness, and are more apt to annoy a horse.

Buckles.—The Buckles of the Madras harness are filed down to an edge on each side of the shield, probably to give them a light appearance, but these edges are liable to cut and tear a horse. the Buckles of the Bengal and Bombay harness have the shields rounded.

We cannot discover any advantages in the Madras pattern (with the exception of the snake hook adverted to) which the pattern in use at the other Presidencies has not, to counterbalance the defects already mentioned.

To obviate the inconvenience pointed out, we would recommend the continuance of the English pattern harness, in use in the Bengal and Bombay Horse Artillery; because we consider its construction is more simple, and that it is better adapted for the service than the Madras pattern, with the further advantage of being known and understood, by the manufacturers in England.

The Saddle being of the old Cavalry pattern, in general use throughout the Horse Artillery in India, no remarks concerning it are necessary.

In concluding this minute, we recommend the following modification in the Bridles.

Bridles.—Head Stall and Reins to be fitted with billet buckles, that the bits may be removed at pleasure.

Bits.—Bridoon or small snaffle with rings: *Curb* with bent branches, and cross bar connecting the branches; as in use with the mounted Regiments of the British Army.

(Signed) { J. Stevenson, Lt. Col. H. A.
W. Whitlie, Bt. Captain, H. A.

I concur in the foregoing minute.

(Signed) C. Graham, Major, H. A.

Appendix B.

MINUTE BY LIEUT. COLONEL TENNANT.

When the subject of the Harness was first before the Board, I was desirous of leaving a question so purely of a Horse Artillery nature, to the decision of the majority of the five Horse Artillery Members; and for myself never having served in the mounted branch of the Regiment, to accept what was so determined. The Madras pattern Harness was thus adopted on the opinions of Colonel Whish, and the Madras Members, in opposition to that of the Bombay Members; who did not, however, enter any dissent. Now when we come to approve of a pattern set, made up according to our former determination, I find, from Major Graham agreeing with the Bombay Members in their objections, a majority of the present Horse Artillery Members, is opposed to the pattern at first fixed upon.

I could have wished that my opinion could still have remained neuter, for I cannot enter into a consideration of the details of the subject of the harness, to decide, when Horse Artillery opinions are equally balanced: but as I coincide with the Bombay Members, and my Bengal Colleague, in thinking the Pads of the off draft horses more clumsy than is necessary; that the mode of fixing the chains to the traces is not so convenient as in the Bengal and Bombay patterns, and that the breeching proposed from Madras would probably be more liable to injure the Horses than that in use at the two other Presidencies: I conceive that if these were again altered, to the pattern as received from Europe, the remaining differences between the patterns now in use at Bengal and Bombay, and that recommended from Madras would be inconsiderable, and that it would be better to use that pattern as the ground work which already exists at two of the three Presidencies, and is known both with them, and with the authorities in Europe.

(Signed) J. TENNANT, LT. COL. *Bengal Arty.*

(True Copies.)

(Signed) J. STUART, LIEUT. COLONEL,
Offg. Secy. to the Govt. of India,
Military Department.

FROM

THE BOARD OF ARTILLERY OFFICERS,

Of the three Presidencies.

TO COL. CASEMENT, C. B.

Secy. to the Govt. of India,

Military Department.

FORT WILLIAM, 30*th July* 1836.

Sir,—We have now the honor to forward our Proceedings on the organization and equipment of Field Batteries, for the purpose of being submitted to the Supreme Government.

(Signed) W. S. WHISH, Col. President.
„ J. STEVENSON, Lieut. Col.
„ J. TENNANT, Major,
„ G. CONRAN, Major,
„ R. S. SETON, Captain,
„ W. T. WHITLIE, Bt. Captain.

(A true Copy.)

(Signed) J. STUART, Lieut. Col.
Offig. Secy. to the Govt. of India.
Military Department.

FIELD BATTERIES.

The Board proceed to discuss the several points relative to the formation of Field Batteries, in the same order as that adopted with reference to Troops of Horse Artillery, and recommend as follows, viz.

ORDNANCE.—That 9 pounder Guns of 5 feet 8·8 inch in length, weighing 10 cwt.; and 24 pounder Howitzers, four feet in length, also weighing 10 cwt.; (both descriptions of Ordnance being cast with elevating screw loops*) be adopted for Field Batteries.

The Board having had reports of practice with 2 light 9 pounders Bengal cast, one of 8 cwt. 3 qrs., and the other of 10 cwt.; together with practice of a 13 cwt. 9 pounder English cast, as carried on by the Bengal Select Committee of Artillery officers, and of which committee their colleague Major Tennant was a member, submitted to them; they are satisfied that no superiority exists in the heavier piece; but they are certain that it would require so many bullocks, or horses to drag it, that it would be an unwieldy piece of ordnance in a battery of manœuvres, and would frequently impede the movements of the Line. They therefore prefer the light gun of 10 cwt. for Field Batteries.

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* It was subsequently decided that the ordnance should be cast without loops.

Nearly the same remarks apply to the light 10 cwt. 24 pounder howitzer, Bengal cast; and the heavy 13 cwt. 24 pounder howitzer, English cast; and the Board are of opinion, that no advantage would be derived, from making either the 9 pounder gun, or 24 pounder howitzer heavier than 10 cwt.

The retention of the light ordnance, will also be attended with the advantage of their being available for the Troops of Horse Artillery, for any particular service as suggested by the Honorable Court.

Proportion of each nature.—That a Field Battery consist of five 9 pounder guns, and one 24 pounder howitzer.

Charge.—That for the 9 pounder gun, to be 2 lbs. 4 ozs.; and for the 24 pounder howitzer, 2 lbs.

ORDNANCE CARRIAGES.—That the following number and description of carriages, be allotted to each Field Battery.

9 Pdr. Carriages	5
9 ,, ,, Spare	1
24 ,, Howitzer Carriages	1
Waggons Ammunition 9 Pdrs.	7
,, ,, 24 ,, Howitzer	2
,, ,, Spare	1
Forge Cart	1
Store Cart	1
Total	19

GUN AND HOWITZER CARRIAGES.

That the principle adopted for the Gun and Howitzer Carriages for the Horse Artillery, be strictly followed for those of Field Batteries; and that the Limbering Loop, Axletree, Wheels, &c. be precisely similar.

The Elevating Screw.—Of the 9 Pdr. to be fixed to the cascable of the Gun,* and that of the 24 pdr. Howitzer to be loose.

Gun Carriage Limber.—The foregoing remarks, equally apply to this carriage, except where Bullock draft is used, when the Yoke will be substituted for the collar bar, the Board prefer the

Bengal Pattern Yoke.—And recommend the ring to be adopted in attaching it to the pole, instead of the clip band. The dimensions must be determined by the size of cattle in use.

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* It was subsequently decided, that the screw should not be fixed to the piece.

Ammunition Waggon.—To be the same in all its parts, as that laid down for a troop of Horse Artillery.

Spare Carriages, Forge and Store Carts.—To be similar in all respects, to those laid down for a troop of Horse Artillery.

One sized Axletree.—To be used with all carriages with Troops and Field Batteries, whether attached to 6 or 9 pounder carriages, 12 or 24 pounder howitzer carriages, ammunition waggons, store, or forge carts.

The same principle to be followed with reference to the wheels, which are to be the same for all field carriages.

Ammunition.—Quantity and proportion of each nature.

For the 9 Pounder.—Each box to carry 15 rounds, which with the gun limber, and one waggon to each gun, and two spare for the 5 guns, will give 10 ⅖th boxes for each piece, or 156 rounds, to be made up of different descriptions as follows, viz.

Spherical case	21
Common and canister case	31
Round shot	104
Total Rounds....	156

To be packed in double tiers as follows, viz.

		S. C. S.	Can.	Round.
Gun limber	Near box	2	3	10
	Off box	2	3	10
Waggon limber	Near box	2	3	10
	Off box	2	3	10
Waggon body	Near fore box	2	3	10
	Off " "	2	3	10
	Near hind "	2	3	10
	Off " "	2	3	10
		16	24	80
2⅖th boxes more on spare waggon		5	7	24
	Total....	21	31	104

For the 24 Pounder Howitzer.

Each box to carry 8 rounds of ammunition, which with the howitzer limber and two waggons, will give 14 boxes or 112 rounds, to be made up of different descriptions as follows,

Spherical case	42
Common ,,	30
Common shells	36
Carcases	4
Total Rounds	112

To be packed as follows:

		S. Case	C. Case	C. Shell	Carcass
Howitzer limber	Near Box	3	3	2	0
	Off Box	3	3	2	0
	Total limber	6	6	4	0
Waggon limber.	Near Box	3	3	2	0
	Off Box	3	3	2	0
Waggon body	Near fore Box	4	0	4	0
	Off ,, ,,	4	0	4	0
	Near hind ,,	2	3	2	1
	Off ,, ,,	2	3	2	1
	Total Waggon and Limber	24	18	20	2
	2d Waggon	18	12	16	2
	Total	42	30	36	4

Cartridges.—Besides the complement of cartridges, for the number of rounds of ammunition, one spare cartridge to be carried in each box, for the 24 pounder howitzer and 9 pounder gun, and one spare cartridge bag.

Implements and small Stores.—The following abstract will shew the number of guns and carriages of all descriptions, together with the quantity of ammunition, implements, and stores, attached to a Foot Artillery Field Battery.

Names of Stores, &c.	For 5,9 pr. Guns and 7 waggons	For 1,24 pr. Hr. and 2 waggons.	For Battery or Spare.
Anvils, Smiths Europe	0	0	1
Aprons, Gun and Howitzer	5	1	0
Augers, Fuze, Hand	10	2	0
„ „ Brace or Breast	5	1	0
Axes, Felling	5	1	0
„ Pick	12	3	0
Axletrees, Iron	0	0	1
Bags, Canvas, fuze for Gun and Howitzer	12	3	0
„ „ for bursting Powder Cartridges	12	3	0
„ Cartridge Empty	52	14	0
Bars, Pole or Collar Iron, when Horses are used, one to each Carriage and 3 spare	12	3	3
Bellows, small Europe	0	0	1
„ Country—pairs	0	0	2
Bitts, Gimblet	5	1	0
„ Gun or vent	12	3	0
Bill Hooks	12	3	0
Bottles Copper, with Spirits of wine	5	1	0
Boxes, Copper for Cartridges	52	14	0
„ Match	5	1	0
„ Ammunition, attached to carriages	52	14	12 *
„ Store	12	3	4 *
„ Match quick, with one Skein	5	1	0
Buckets, water wood	12	3	4 *
Caps, Canvas, for Spunge heads	15	3	0
Carriages, Ammunition	7	2	1
„ Gun and Howitzer	5	1	1 †
Cart, Forge with Limber	0	0	1
„ Store „ „	0	0	1
Cartridges Serge, filled for charge and spare (one spare in each Box)	832	126	0
„ „ for priming, one in each box for howitzer, and two for 9 pdr.	104	14	0
„ „ filled bursting 12 oz.	0	36	0
„ „ „ „ 6 „	0	42	0
„ „ „ „ 4 „	105	0	0
Chains linking (used with horse draft only)	24	6	5
Compasses, common	5	1	0
„ calibre small	0	0	3
Cork screws	12	3	0
Covers canvas, painted, one to each box	52	14	12 *
Crows, iron	5	1	0
Drag ropes	24	6	8 *
Drift, gun or vent	12	3	0

* With spare Carriages and Carts.
† Gun Carriage.

NAMES OF STORES, &c.	For 5,9 pdr. Guns and 7 waggons.	For 1,24 pdr. Hr. and 2 waggons.	For Battery or Spare.
Esses, iron	12	3	4 *
Felloes	12	3	4 *
Files, hand or tennon saw	0	0	3
Funnels, copper	0	0	3
Fuzes graduated sphr. case 4 to each	420	312	0
Gimblets	5	1	0
Glasses, spying	0	0	2
Hammers, claw	12	3	0
„ wrench	12	3	0
Handspikes, common	14	4	2
„ trail or traversing attached to carriages	5	1	1
Hatchets, hand	12	3	0
Haversacks, gun, ammunition	10	2	0
Hooks, limbering	0	0	1
Kegs, grease	7	2	3
Knives, laboratory	5	1	0
„ clasp, English	12	3	0
Line, seizing Skeins	52	14	12 *
Loops, beam trail	0	0	1
Mallets, Fuze, with setters	12	3	0
Mamoties	12	3	0
Match Slow, Gun cotton Skeins	52	14	0
Oakum, for packing	as required.		
Ordnance, brass, Field Light	5	1	0
Padlocks, brass small	64	17	16 *
Paulins, wax	0	0	2
Pincers, Fuze	12	3	0
„ Gun	12	3	0
Pins, Linch	0	0	19
„ Pole	0	0	19
„ Swivel, Yoke or Collar bar	0	0	19
Poles, or Shafts	0	0	3
Portfires,	208	42	0
Pouches, priming	12	3	0
Quadrant	0	0	1
Rasps, Fuze	12	3	0
Rope Europe 1½ inch Fathoms	144	36	48
„ „ 3 „ „	24	6	8
Saws, Fuze	12	3	0
Scales, Tangent	5	1	0
„ Copper with Beam 4 lbs. to ¼ oz. weights Sets	0	0	1

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* With spare Carriages and Carts.

NAMES OF STORES, &c.	For 5 9 Pr. Guns and 7 Waggons	For 1, 24 Pr. How. „ 2 Waggons	For Battery or Spare.
Scales, Gunters	0	0	3
Scissors	12	3	0
Screws, elevating attached to carriages	5	1	1
Setters, Saw, Steel	5	1	0
Shells, common	0	36	0
„ Shrapnell	105	42	0
„ Carcass	0	4	0
Shot, Canister Grape	155	30	0
„ Round	520	0	0
Spokes, Spare	12	3	4
Spikes, Gun Spring double	12	3	0
„ „ Jagged	12	3	0
Spike relievers	12	3	0
Spunges (to be of Bengal pattern)	15	3	0
Straps leather, with buckles for securing side Arms.	As required.		
Sticks, Portfire	12	3	0
Swingletrees pairs, in Horse draft only	12	3	0
Swivels, Collar bar .... do	12	3	2
Twine, Europe .... Skeins	12	3	0
Vices, Fuze Block	5	1	0
„ „ Hand	5	1	0
Wad Hooks	5	1	0
Washers, drag	48	12	16 attached to Spare carriages & 19 Spare
Wax cloth .... Yds	12	3	0
Wires, priming	12	3	6
Wrenches common	5	1	0

The aforementioned Stores, are independant of what are carried for the use of Artificers, in quantity and description agreeable to the regulations of the different Presidencies.

In Bullock draft the following will be required.

Chains Trace, Pole yoke	12	3	4
„ „ Leading .... One to each pair of	Bullocks.		
Swivels ring, Pole yoke Bullock	12	3	4
	for Spare carriages, Store and Forge Carts and 15 Spare for Battery.		
Yokes, Bullock, Pole or trace	One to every pair of Bullocks, when in draft, or spare; half with spare Bullocks to be pole Yokes.		

ORGANIZATION.

Number of men proposed for a European Company.

1 Staff Serjeant.
5 Serjeants.
1 Drill Corporal.
5 Corporals.
10 Bombardiers.
80 Gunners.
2 Drummers and Fifers.
1 Pay Serjeant (Non-Effective.)

LASCARS.

Subadar.	One of each rank, or two of either, to a Battalion of Four Companies.
Jemadar.	
2 Havildars.	To be furnished with Pioneer Tools, and to act in that capacity with the Artillery on a march.
2 Naicks.	
40 Lascars	
4 Lascar Boys.	Peculiar to Madras, in all branches of the Army.
4 Pension Boys.	

N. B. Puckallies and Bheesties, to remain as at present established for the different Presidencies, as well as the other details of Bazar and Quarter Master's Establishment.

NATIVE OR GOLANDAUZE COMPANY.

1 Subadar.
2 Jemadars.
6 Havildars including 1 Staff Havildar.
6 Naicks including 1 Drill Naigue,
10 Bombardiers.
2 Drummers or Buglers.
80 Privates.
3 Recruit Boys. Peculiar to Madras, in all branch-
4 Pension Boys. es of the Army.
1 Pay Havildar Non-effective.

Bazar and Quarter Master's Establishment, to remain the same at the different Presidencies, as at present established.

N. B. With reference to the number of Post Guns in Bengal, it may be necessary to keep the Golundauze Companies at that Presidency, of their present strength; but for a Battery of 6 Guns, the Bengal Members consider the above detail as sufficient.

It is proposed to dispense with the Gun Lascars, attached to Golundauze companies at Madras and Bombay, the same as in Bengal.

The Establishment of Artificers, to Field Batteries, to be the same as that recommended for a Troop.

With reference to the repair of Carriages, the Bombay Members submit a Minute* on the subject, recommending the adoption of the contingent allowance at that Presidency as practised in Bengal.

The following Table will shew the Staff at present attached to the Head Quarters of Battalions, at the several Presidencies, and that recommended by the Board, for general adoption.

EUROPEAN BATTALION.	Bengal.	Madras.	Bombay.	Recommended.	REMARKS.
Adjutant	1	1	1	1	The Board think, that an Adjutant and Quarter Master in separate persons, are indispensable to each Battalion and that they should be effective.
Quarter Master		1	1	1	
Serjeant Major	1	1	1	1	
Quarter Master Serjeant	1	1	1	1	
Drill Serjeant	1	1	1	1	
Hospital Serjeant	1	0	0	1	
School Serjeant	1	1	0	1	
Drill Corporal	1	1	1	0	Recommended to be attached to companies.
Drum Major	1	1	1	1	
Fife Major	1	1	1	1	

School Mistresses, Bazar and Quarter Master's Establishments, to be allowed agreeable to the regulations at the different Presidencies.

NATIVE BATTALION.	Bengal.	Madras.	Bombay.	Recommended.	REMARKS.
Adjutant	1	1	1	1	
Qr. Master & Interpreter	1	1	1	1	
Serjeant Major	1	1	1	1	
Quarter Master Serjeant	1	1	1	1	
Drill Serjeant	1	0	0	1	
Havildar Major	1	1	1	1	
Qr. Master Havildar	1	0	0	1	
Drill Havildar	1	1	1	1	
Drill Naick	1	1	1	0	Recommended to be transferred to companies, as in European Battalion.
Drum Major	1	1	1	1	
Fife Major	1	1	1	1	

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* Marked A. in Appendix,

DRAFT CATTLE.

The different power possessed by the draft bullocks at the several Presidencies, renders it quite impossible to lay down any particular proportion for India generally. The Board therefore, have inserted what is considered necessary, and with reference also to the regulations in force at each Presidency. As the waggons are nearly of the same weight, as the gun carriages, &c. the Bombay Members state, that they have adopted the same proportion in their calculation for the waggons, as allowed for the guns.

Detail of drivers and bullocks, required for Field Batteries at the three Presidencies.

	Bengal.		Madras.		Bombay.	
	Drivers.	Bullocks.	Drivers.	Bullocks.	Drivers.	Bullocks.
Six guns, or howitzers	24	48	30	60	36	72
Nine ammunition waggons	36	72	36	72	54	108
One spare nine pounder carriage	3	6	3	6	3	6
„ „ Ammunition waggon	3	6	3	6	3	6
One forge cart	3	6	3	6	3	6
One store cart	3	6	3	6	3	6
One-sixth spare	12	24	13	26	17	34
Spare for casualties and sick	11	0	0	0	0	0
Total......	95	168	91	182	119	238

BENGAL.	MADRAS.	BOMBAY.
Staff N. Commissioned.	Staff N. Commissioned.	Staff N. Commissioned.
1 Bullock Serjeant	1 Bullock Serjeant	1 Bullock Serjeant
3 Sirdars 1st class	1 Darogah	3 Muccadams 1st class.
3 „ 2d „	3 Chowdries	3 „ 2d „
TOTAL.	TOTAL.	TOTAL.
1 Bullock Serjeant	1 Bullock Serjeant	1 Bullock Serjeant
3 Sirdars 1st class	1 Darogah	3 Muccadams 1st class.
3 „ 2d „	3 Chowdries	3 „ 2d „
95 Drivers	91 Drivers	119 Drivers
168 Bullocks	182 Bullocks	238 Bullocks

The Board are of opinion however, that no battery drawn by bullocks can effectually manœuvre with the Infantry, especially as will commonly be the case in India, after a march of some length, and in ground which has been ploughed, or which from other causes is not perfectly smooth. The experience of the Bengal Presidency has, they conceive proved this sufficiently, and the Court of Directors have admitted the principle, in their Orders published in Bengal in 1827, by which all the Field Batteries at that Presidency, were ordered to be supplied with horses. These remarks equally apply to the other Presidencies, where the bullocks are confessedly of an inferior description to those in Bengal, and as in consequence of this inferiority, more must necessarily be allowed, the difference of expense would not be so great an object. The Board have therefore objections to the retention of bullocks for the Field Batteries, and beg strongly to press on the notice of Government, the importance of allowing horses to all Field Batteries on the following scale, viz.

For 9 pounders at 6 horses each........	30
„ 1 24 ,, howitzer at ditto........	6
„ 6 waggons at 6 horses each.........	36
„ 2 Staff Serjeants....................	2
„ 2 Buglers...........................	2
„ One-sixth spare.....................	16
Total....	89

With the following establishment of Syces, viz.

36	Syces to ride the near horses.	On the same rate of pay, as that allowed for corresponding ranks in the gun lascars.
36	„ for the off „	
4	„ „ saddle ,,	
21	„ drivers for spare horses & casualties	
97	Three of whom to be Havildars, and 3 Naigues.	

For the draft of the extra ammunition waggons and spare carriages, the Board would recommend the following establishment.

	Bengal.	Madras.	Bombay.
Three ammunition waggons at 8 bullocks, at Bengal, and Madras; and 12 at Bombay, for each	24	24	36
One spare 9 pounder carriage	6	6	6
One spare ammunition waggon	6	6	6
One forge cart	6	6	6
One store cart	6	6	6
	48	48	60
Add one-sixth spare	8	8	10
Total bullocks	56	56	70
With 2 Sirdars and drivers or 1 driver to every two bullocks..................................	28	28	35

One European Farrier (Non Effective.)

Two Native Farriers, and one Moochie.

The Bombay Members submit a Minute marked B in appendix, with reference to Field Batteries in Bombay, and in which the rest of the Board concur.

Field Battery Exercise.

The Board recommend that the Field Battery exercise be the same as in the Royal Artillery, with such alterations, as are imperatively necessary from the difference in organization and constitution of Indian Field Batteries; but is of opinion that this revision, cannot be undertaken by the Board with due regard to para. 11 of the Military Secretary's Letter No. 411 of May 1836, as it would be a work, not only requiring a very long time for its accomplishment, and a Field Battery to be available, but it could not even be commenced upon until the dry season.

The Board deem it however proper to observe, that no officer of any Field Battery in India, can do his duty efficiently, unless provision be made (as in Europe) for his being mounted.

(Signed)
W. J. Whish, Col. *President.*
J. Stevenson, Lieut. Colonel.
J. Tennant, Major.
G. Conran, Major.
R. S. Seton, Capt. Madras H. Arty.
W. Whitlie, Bt. Captain.

APPENDIX.

Minute A.

There is an omission in the existing regulations of the Bombay Presidency, relative to Field Batteries, which it is proper here to notice, viz. that of an arrangement whereby the Commander of a battery, may be enabled to maintain his charge at all times in readiness for immediate service, and be held personally responsible for the perfect and complete state of his equipments in every respect, as he is now for all other details appertaining to it.

Under the present system, carriages requiring repairs beyond those of the most trifling description, are sent to the Ordnance Department after survey by a committee. In like manner all articles of equipment and small stores (however petty) when damaged or worn out, are required to be reported upon by a committee. Upon these, indents are next to be framed and submitted for the sanction of the station and division authorities.

This routine for effecting repairs, and for receiving small stores, frequently occasions considerable delay, but what is of far greater importance, the battery in the mean time remains incomplete, and the principal object, readiness for immediate service, calculated upon in all Field Batteries, is here lost sight of.

To remedy the defects pointed out, and to fix the responsibility of Field Batteries being held at all times in service order, in the person of the proper officer, the Commander, we beg to recommend, that the contingent gun allowance, with the proportion of artificers, as allotted for each battery in Bengal, may be granted to the Captain or officer in actual charge of the battery, whether of Horse or Foot, for the execution of such repairs, and for the keeping up of the articles of equipment and small stores attached to the guns, as are enumerated in the G. O. G. G. 24th October 1828, upon this subject.

Pay and audit regulations 1835
Pages 6, 7, 8, 10 and 11

The adoption of the proposed arrangement, would, we believe, be less expensive to the State, and be attended with greater efficiency.

(Signed) J. STEVENSON, Lieut. Colonel.
W. WHITLIE, Bt. Captain.

Minute B.

The Board having fixed the strength of a company of Foot Artillery, and the proportion of ordnance carriages and cattle to be allotted for its service, the Bombay Members submit the following observations, premising that the only organized Field Batteries in existence under the Bombay Presidency, are those of the four troops of Horse Artillery, and the nucleus of a Field Battery, consisting of four guns, (without waggons) drawn by mules, attached to the company of Artillery in the Province of Kutch.

On comparing the number of field guns equipped and furnished with cattle and regular drivers, in the Presidencies of Bengal and Madras; it will be seen, that a principle has been adopted in determining the proportion, with reference to the number of regiments in each army, approximating very closely to a like result.

The Bengal Army consisting of 83 regiments of Infantry, and 12 regiments of Dragoons, and Light Cavalry; has 12 Batteries of Horse Artillery, and 12 Field Batteries, each of 6 guns; or a Total of 144 guns, to 95 regiments.

The Madras Army having 61 Regiments of Infantry, and 9 Regiments of Dragoons, and Light Cavalry; has 6 batteries of Horse Artillery, and 10 Field Batteries. Three of the former have each 6, and three each 4 pieces, while the Field Batteries are of 8 pieces each, thus giving 110 guns to 70 regiments.

Upon the foregoing data, the proportion of Light Field Guns for the Bombay Army, consisting of 31 Regiments of Infantry, and 4 Regiments of Dragoons, and Light Cavalry, would be 9 Batteries of 6 pieces each, or 54 Guns to 35 regiments.

In the supposition that the Horse Artillery, will at all times be maintained upon an efficient establishment, and the 4 Troops kept complete in men and horses, ready for immediate movement; we propose proceeding with our remarks on the subject of the cattle establishments required for each of the remaining five Field (foot) Batteries, bringing under consideration, the system which has hitherto prevailed in the Bombay Presidency, for supplying draft Bullocks for Light Field Ordnance, and for siege Trains, on calls for service.

Whenever cattle have been required for either of these purposes, they have been procured thro' the Commissariat

Officers, who must hire for the occasion, if the small number they contract for, be insufficient to meet the demand made. It would be needless to point out, that Bullocks so furnished, with Drivers who are the common coolies of the country, entertained upon an emergency by a contractor, and with whom rests the payment of their hire, and the feeding of the animals, can never be considered as an establishment for service.

The opinion entertained by the Board, of the inefficiency of bullocks even of the very best description, for light Field Batteries, founded upon the results of ample trials during periods of past service, is recorded in unqualified terms upon our proceedings; but as more especially regards the horned cattle of the Bombay Territories, it is as well to remark, that, from their want of physical power, a lengthened train is a matter of necessary consequence, the evils on service coincident with which, require not to be expatiated upon. The load apportioned for a bullock under the two Presidencies of Bengal and Bombay respectively, is for the former 210 lbs. and for the latter 120 to 140 lbs., and this at once shews the comparative power of the two descriptions.

A brief notice of the mules in use at Bombay is necessary. They were brought from Persia about 13 years ago, at the suggestion of the then Commander in Chief, Sir C. Colville. For some time, they were attached for the draft of the Horse Artillery Waggons, but for the last 8 years, have been applied to the Light Field Guns of the Foot Artillery. In this long period, they have undergone various trials, affording satisfactory proofs of their fitness of the service. Longevity, health, hardihood, capabilities of exertion in protracted and forced marches, and endurance of fatigue and privation are the characteristics of this animal, and although they have always been picketed in the open air, and exposed to all kinds of weather, their casualties have only averaged one per cent per annum, and none appear to have been cast. It may be here remarked that Sir A. Dickson has recorded his opinion of the durability and efficiency of mules for Light Field Batteries.

The main objection urged to the use of mules, is, that they are foreign animals; but when it is considered that their longevity, and reduced proportion of casualties, render but few remounts necessary to keep up the establishment once completed, the objection must necessary lose much of its force.

From enquiries that have been instituted, it would appear that mules are procurable in any number, not only in Persia, but in Scinde, Candahar, and neighbouring states, at a cost of less than 200 Rupees each.

The substitution of horses for bullocks in light Field Batteries in Bengal, appears to have originated from absolute necessity, upon grounds already recorded, and as the superior efficiency of Field Batteries drawn by horses, during the last Mahratta war, induced the home authorities to sanction an increase to the number first experimented with, no particular observations on this point are required; further, than that however much the urgency of economy, may have since tended to replace them upon their former ineffective footing with bullocks, it is presumed that the merits of the horse batteries have been so fully established, as to warrant the conclusion, that horses will again be granted in the event of any active or general service.

We now lay before the Board, *rough estimates* of the relative expense, of maintaining an establishment of cattle and drivers for light Field Batteries; drawn respectively by bullocks, mules, and horses; and with reference to the excess in the two last estimates, above the former detail, we trust that the certainty, with which government will at all times, have its services executed, with either of the latter description of animals, will be far more commensurate with the real interests of the State, than the maintenance of light Field Batteries drawn by bullocks, at a trifling less monthly cost, the services of which, at any distant point, can never be depended upon with any degree of confidence or surety.

Upon whatever system of draft, the Supreme Government may decide, we beg leave to urge the indispensable necessity of permanent establishments of cattle, and regularly enlisted drivers being maintained, as integral parts of a Field Battery, upon the system prevailing in Bengal and Madras; and in conclusion to remark, that with horse or Mule Batteries so constituted, a reduction may be made of the present establishment of gun lascars, (but which cannot be dispensed with in Bullock Batteries) and that such reduction would bring the expenses of the Horse and Bullock Batteries, nearly upon a par, while those of a Mule Battery would be somewhat lower than either.

Thus a horse battery to about. .Rupees	1826	13	8	
A bullock battery to........... „	1798	0	0	and
A mule battery to........... „	1695	8	0	

Signed {J. Stevenson, Lieut Col.
W. Whitlie, Bt. Capt.

Allotment of horses, mules or bullocks with drivers, for a light Field Battery of five 9 *pounder and one* 24 *pounder howitzer, with* 6 *waggons attached.*

Horse Battery.

6 pieces of ordnance at 6 each........................	36
6 waggons „ „........................	36
2 staff serjeants 2 buglers {at present on the strength of each company}	4
	76
Spare ⅙th	13
Total	89

Syce Drivers.

3 Havildars
3 Naicks

89 Syce drivers, including spare syce drivers; with the pay, batta, clothing, and all advantages of gun lascars; havildars and naicks with those of corresponding ranks.

With the above establishment, the gun lascars viz. 1 Native officer, 2 havildars, and 30 privates may be dispensed with, and the sum of about rupees 272 at present incurred by their pay and clothing, will be a set off in diminution of the expense of a horse battery.

Mule Battery.

6 pieces of ordnance at 8 each........................	48
6 waggons at 8 each........................	48
2 staff serjeants 2 buglers {at present on the strength of each company}	4
	100
Spare ⅛	12
Total	112 mules

Syce Drivers and Syces.

3 Havildars

3 Naicks

72 Syce drivers, including spare syce drivers, with the pay, batta, clothing and all advantages of gun lascars; havildars, and naicks, with those of corresponding ranks.

20 Being one to two of the remaining mules, with the pay of syce as in mounted regiments.

With the above establishment, the gun lascars vizt. 1 Native officer, 2 havildars, and 30 privates may be dispensed with, and the sum of about rupees 272 at present incurred for their pay and clothing, will be a set off in diminution of a mule battery.

BULLOCK BATTERY.

6	Pieces of ordnance at 12 each, as allowed by the regulations	72
6	Waggons, being of like weight, at 12 each	72
		144
	Spare $\frac{1}{6}$	24
	Total	168 bullocks

1	Bullock Serjeant	
3	First Muccadums	These to be regularly enlisted, clothed, and to have all the advantages of gun lascars.
3	Second do.	
84	Drivers	

Estimate of comparative Monthly Expenses, for an Establishment of Horses, Mules, and Bullocks respectively, for the draft of a Light Field Battery of Five 9 Pounders, and One 24 Pounder Howitzer, with 6 Waggons attached.

Mules.	Amount per Month.		
Wear and tear of 112 mules at 250 Rs. each, including all charges to Bombay, estimated to last 15 years	155	8	0
Wear and tear of 112 single sets of Harness, at 30 Rs. each estimated to last 8 years... ...	35	0	0
Allowance for head and heel ropes for 112 mules, at 2 Rupees each........	224	0	0
Clothing stoppages for 3 Havildars, 3 Naicks and 72 drivers	42	0	0
Allowance for 112 sets of harness and saddles ...	112	0	0
Pay to 3 Havildars of drivers, at 12 Rs. each ..	36	0	0
„ 3 Naigues „ 9 „ „ ...	27	0	0
„ 72 Drivers 7 „ „ .	504	0	0
„ 20 Syce Drivers 6 „ „ ...	120	0	0
„ 1 Native Farrier	15	0	0
„ 75 Grass cutters (2–3 the number of mules) 5 Rs. each	375	0	0
Grain at Rupees 2-14 each	322	0	0
	1967	8	0
Deduct by the abolition of one Native Officer, 2 Havildars and 30 Privates of Gun Lascars.	272	0	0
Charge for a Mule Field Battery	1695	8	0

Horses.	Amount per Month.		
Wear and tear of 89 Horses, at 300 Rs. each, including all charges, estimated to last 8 years..	278	2	0
Wear and tear of 89 single sets of Harness and Saddles, at Rupees 30 each, estimated to last 8 years........	27	15	8
Allowance for head and heel ropes for 89 Horses, at 2 Rs. each........	178	0	0
Clothing stoppages for 3 Havilders, 3 Naicks at 1 Rupee, and 89 Syce Drivers, at 8 annas each	50	8	0
Pay to 3 Havildars at 12 Rupees each........	36	0	0
„ 3 Naigues „ 9 „ „	27	0	0
„ 89 Drivers „ 7 „ „	623	0	0
„ 1 Native Farrier........	15	0	0
„ 1 Muccadum Grass Cutter........	10	0	0
„ 30 GrassCutters at Rs. 5 ea. } agreeable to regulations.	150	0	0
Forage for 59 Horses at 4 Rs. } agreeable to regulations.	236	0	0
89 Horses Grain at 4¼ Rupees........	378	4	0
Allowance for Harness and Saddles........	89	0	0
	2098	13	8
Deduct by the abolition of one Native Officer. 2 Havildars, and 30 Privates of Gun Lascars	272	0	0
Charge for a Horse Field Battery	1826	13	8

Estimate of Comparative Monthly Expenses, &c.

Bullocks.	Amount per Month.			Remarks.
1 Bullock Serjeant, Staff Pay	10	0	0	
3 First Muccadums at 10 Rupees each	30	0	0	To be clothed and to receive when marching, the Batta of Gun Lascars, also the advantages of the Invalid and Pension Establishment.
3 Second " at 8 " "	24	0	0	
84 Drivers at 6 Rupees each.	504	0	0	
Clothing stoppages for 6 Muckadums (as Havildars and Naicks) 84 Drivers (as Gun Lascars)	48	0	0	
Feeding 168 Bullocks at* 6 Rupees each	1008	0	0	
Wear and tear of 168 Bullocks purchased at 40 Rupees each, to last 8 years.	70	0	0	
Allowance for Jools, Currycombs, Mussulah, &c.	84	0	0	
Wear and tear of Traces, &c.	20	0	0	
The charge for Bullock Field Battery	1798	0	0	

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* The actual charge (as given by Colonel Frederick in his Finance report) for feeding 52 Bullocks at Ahmednuggur, is stated to be Rupees 403, and in the same document, for feeding 54 Bullocks at Poonah, Rupees 564; so that the absolute cost of feeding a Bullock, is from this data about Rupees 9 0 0. The above estimate has been framed at Rupees 6 or 2-3 of that amount.

	Rs.	A.	P.
The estimate for a horse battery, retaining present establishment of gun lascars......	2098	13	8
Do. do. for a mule battery, retaining gun lascars......................	1967	8	0
Do. do. for a bullock battery, retaining gun lascars..............	1798	0	0
The estimate for a horse battery, abolishing the present establishment of gun lascars..	1826	13	8
Do. do. for a mule battery, abolishing the present establishment of gun lascars..............................	1695	8	0
Do. do. for a bullock battery, retaining the present establishment of gun lascars, which cannot be dispensed with..................................	1789	0	0
From the foregoing, it appears that the monthly expense of a horse battery, exceeds that for a mule battery, by......................	131	5	8
The monthly expense of a bullock battery, exceeds that of a mule battery, by......	182	8	0
The monthly expense of a horse battery, exceeds that of a bullock battery, by......	28	13	8

Signed { J. STEVENSON, Lieut. Col.
W. T. WHITLIE, Bt. Capt.

(True Copies)

(Signed) J. STUART, Lieut. Col.
Offg. Secy. to the Govt. of India.
Military Department.

FROM

THE BOARD OF ARTILLERY OFFICERS,
Of the three Presidencies.

TO COLONEL CASEMENT, C. B.
Secy. to the Govt. of India,
Military Department.

SIR,—We have the honor to acknowledge the receipt of your letter No. 37 of the 5th Instant; and in reply beg to submit, that with reference to the whole of the Horse Artillery being equipped with 6 pounder guns, and 12 pounder howitzers; we are unanimously of opinion, that arming the Field Batteries of foot artillery with 9 pounder guns, and 24 pounder howitzers; will, as a general principle, be found the most advantageous; and for particular services, a supply of 6 pounders might be kept in magazines, and accompany parks, so as to answer any emergent call for ordnance of that description; but as a permanent arrangement, we decidedly object to any mixture in the same battery, of guns of different calibre.

The difference of weight between a 6 and 9 pounder gun and carriage, including the ammunition in the limber, will be about four and a half hundred weight; and the weight of a 9 pounder ammunition waggon, will exceed that of a 6 pounder by rather more than one hundred weight. On this account, two bullocks above the complement allowed in a 6 pounder battery, have been considered necessary in Bengal for each carriage, whether gun or waggon; and for the other Presidencies a proportionate increase, except for the waggons at Madras, where eight bullocks per waggon being the present proportion, no increase on account of the additional hundred weight is deemed necessary.

Including then the two extra waggons, required for the conveyance of nearly an equal number of rounds of 9 pounder ammunition, to that carried for a 6 pounder with one waggon allotted to each gun; there will be for the five 9 pounders, an increase of 42 bullocks in Bengal, 31 at Madras, and 52 at Bombay, to what would be necessary, for the same number of 6 pounders; but the great superiority of fire possessed by the former, will, we conceive amply compensate for the difference of expense, nor are we under the slightest apprehension, that with this proportion of cattle, the celerity of our armies will be at all affected; any more than that difficulty will be experienced under proper arrangements, for an ample supply of bullocks of the first quality, for the draft of the heavier equipment.

Our reasons for adopting six guns instead of eight in a Field Battery, were, that six guns could be served as well as they have been, by the same number of men and officers as are at present allowed for a company; and although we could easily have allotted a proportion of men to each company, adequate to the service of eight guns; we could not have done so with the officers, without altering the proportions of the different ranks in the whole Artillery corps; for although we have not as yet noticed the officers of a Field Battery, we are of opinion that the four at present allowed, are not sufficient for the superintendence of six guns, and to meet besides the other contingencies of the service; but if batteries are augmented to eight guns, we consider it indispensable that two more officers should be added to each company. There is however another objection to eight guns in India, where three regiments have been the usual number forming a Brigade on service; and six Guns appear to us the most convenient number to allot to such Brigades; for a Field Battery would thus hardly ever require to be broken in upon, for the Brigading of an Army; whereas if eight Guns were fixed upon, this would be a constant occurrence in the distribution of the Field Artillery.

With reference to the last paragraph of your letter, we have the honor to annex a Statement, shewing the composition we would recommend for a Company of Artillery for the service of a Field Battery of eight pieces.

Signed
W. S. WHISH, Colonel, *President.*
J. STEVENSON, Lieut. Colonel.
J. TENNANT, Major.
G. CONRAN, Major.
R. S. SETON, Captain.
W. WHITLIE, Bt. Captain.

FORT WILLIAM,
14*th September* 1836.

(True Copy.)

(Signed) J. STUART, *Lieut. Colonel,*
Offg. Secy. to the Govt. of India,
Military Department.

Statement shewing the manner in which a Company of Artillery should be composed, for the service of a Field Battery of eight pieces.

European Company.

1 Staff Serjeant.
6 Serjeants.
1 Drill Corporal.
6 Corporals.
12 Bombardiers.
104 Gunners.
2 Drummers or Buglers.
1 Pay Serjeant (Non-Effective.)

Lascars.

As with a Company for 6 pieces.

Quarter Master's Establishment.

An Extra Puckallie.

Native Company.

1 Subadar.
2 Jemadars.
7 Havildars (including Staff Havildar.)
7 Naicks (including 1 Drill Naick.)
12 Bombardiers.
2 Drummers or Buglers.
104 Privates.
2 Recruit Boys. } Peculiar to Madras, in all
4 Pension Boys. } branches of the Army.

Quarter Master's Establishment.

An extra Hand Bheestie.

CATTLE AND DRIVER COMPANY.

	Bengal.		Madras.		Bombay.	
	Drivers.	Bullocks.	Drivers.	Bullocks.	Drivers.	Bullocks.
8 Guns or Howitzers.	32	64	40	80	48	96
13 Ammunition Waggons.	52	104	52	104	78	156
1 Spare 9 Pr. Carriage.	3	6	3	6	3	6
1 „ Ammunition waggon	3	6	3	6	3	6
1 Forge Cart.	3	6	3	6	3	6
1 Store Cart.	3	6	3	6	3	6
⅛th Spare.	16	32	20	40	23	46
Spare for casualties or sick.	13	0	0	0	0	0
	125	224	124	248	161	322

Bengal.	Madras.	Bombay.
Staff and Non-Comd.	*Staff and Non-Comd.*	*Staff and Non-Comd.*
1 Bullock Serjeant.	1 Bullock Serjeant.	1 Bullock Serjeant.
4 Sirdars 1st Class.	1 Darogah.	4 Muccadums 1st Class.
4 „ 2d do.	4 Chowdries.	4 „ 2d do.
Total.	Total.	Total.
1 Bullock Serjeant.	1 Bullock Serjeant.	1 Bullock Serjeant.
4 Sirdars 1st Class.	1 Darogah.	4 Muckadums 1st Class.
4 „ 2d do.	4 Chowdries.	4 „ 2d do.
125 Drivers.	124 Drivers.	161 Drivers.
224 Bullocks.	248 Bullocks.	322 Bullocks.

(True Copy.)

(Signed) J. Stuart, *Lieut. Colonel.*
Offg. Secy. to the Govt. of India.
Military Department.

FROM

THE BOARD OF ARTILLERY OFFICERS
OF THE THREE PRESIDENCIES.

To

COLONEL CASEMENT, C. B.
Secy. to the Govt. of India,
Military Department.

DATED 28*th February* 1837.

SIR,

In forwarding the final proceedings of the Board; we have the honor to report, that the Madras 12 Pdr. Howitzer Carriage has been altered conformably to our recommendation, and that it now affords a general idea of the mode in which the Light Field Artillery Carriages proposed by us, are to be constructed.

Should the Supreme Government be pleased to confirm our proceedings, we recommend that a new Carriage of each description (Field and Siege) should be made up under the superintendence of one or more Officers who have a knowledge of our proceedings, and that previous to the final adoption of any of these Carriages for the service, each and every one of them be subjected to severe trials at Dum Dum, in order that any parts found weak or defective may be strengthened or altered by the Officers entrusted with the duty of constructing the musters required for the several Presidencies; previous to their being commenced upon, we consider the trials proposed indispensable, as the Members of the Board have had no opportunity of satisfying themselves of the efficiency of the Carriages constructed in the manner recommended in their proceedings.

After the trials suggested we would recommend that musters of the several carriages with drawings; exhibiting in a tabular form, the measurements and weights of their component parts, and also of their equipments, be furnished to the several Presidencies; and as one pattern limber has been fixed upon for the siege carriages, and another for the light field carriages ; one only of each description will be sufficient to accompany the muster carriages.

(Signed)
J. Stevenson, Lieut. Col. *President.*
J. Tennant, Lieut. Col. Artillery.
C. Graham, Major.
G. Conran, Major.
R. S. Seton, Captain.
Wm. Whitlie, Bt. Captain.

Fort William, 31*st January* 1837.

The Board having already in their letter of the 14th Sept. 1836, to the Military Secretary to Government adverted to the deficient proportion of officers, at present allowed to troops and companies of Artillery, think it not irrelevant, in closing their proceedings to submit for the consideration of Government the following observations on that subject.

The Board assumes it as an admitted fact, that a Field Battery should have a subaltern or other officer in immediate command of every division of two guns, with a Captain at least in general command of the battery ; and when a battery shall amount to so many as eight guns, another officer, independent of this proportion, should be available to command the half battery when detached from the Captain ; one object of this formation being the better, and consequently the more frequently to admit of such a division of the battery.

On this principle, a battery of six guns would require a Captain and three subalterns ; a battery of eight guns would require two Captains and four subalterns or one Captain and five subalterns, to be actually employed with it.

The former is the number at present fixed for a troop and company of European Artillery, and consequently if we consider the proportion of officers allowed to be on furlough, those who must be occasionally sick, and who must also be otherwise employed, it appears impossible to expect the number for six guns can ever be present with it ; the Board are therefore of opinion, that to provide for this emergency, a troop or company of Artillery proposed for the service of six guns, should not have less in this country, than five officers allowed for it, and if for eight guns, not less than seven officers would be requisite as the fixed establishment.

The Board observe, that in the Royal Service six officers are allowed for every company of Artillery, destined however to serve no more than six guns ; while they have not those calls on their efficiency required for furlough, and the greater insalubrity of the Indian climate.

The Board would further add that a company of Artillery in Bengal ; had, previous to the regulations in 1796, which first admitted of officers being absent on furlough, the same proportion of officers to a company as they have now ; and that in 1781 under Sir Eyre Coote, and in 1790 under Lord Cornwallis, two extra subalterns were taken with each company that was sent to the coast.

This proportion of officers therefore, the Board conclude, was not more than sufficient even under the regulations which permitted no absentees on furlough ; which now amount to $\frac{1}{6}$ of the Captains and subalterns of regiments.

But the Board would further observe, that the present proportion to the European Artillery is rendered still more ineffective by the very small establishment fixed for the Golundauze battalions.

It seems to have been assumed that in the Artillery, as in the Infantry, half the number of European officers would suffice for the Natives, that are allowed for the Europeans ; but the Board think the circumstances of the two services are so different, that the same rule cannot be applied. The Board cannot for a moment suppose that a native officer who has risen from the ranks ; and is totally devoid of education ; can be substituted in any professional duty, for the European Artillery officer, whom the state is so careful to instruct, for that peculiar service, and as the same number of men in the Golundauze are allowed for a battery as in the European battalions, they are consequently destined to serve the same number of guns. But it is by the number of guns which are to be served, that the number of Artillery officers must be determined, and consequently it does not appear to the Board, the Native Artillery should have less than the Europeans, though they think, there are reasons why, if any thing, the Golundauze should be even *better* prepared against casualties, to preserve their effective number complete.

The Board therefore strongly urge the reconsideration of the number of officers for a Native battalion of Artillery, for whenever its men are employed, they are not allowed to remain with the same proportion of officers, but it is always endeavoured to furnish them in the same proportion as for Europeans; and the consequence is that they are drawn from the European companies ; an arrangement, which operates to prevent the European Artillery from being supplied even so well as existing numbers for each company would admit, were the same number general throughout all the Troops and Companies of the Corps, as in the Royal Service.

The Board beg leave also respectfully to offer to Government; the following observations regarding the system of uniformity in Artillery equipments, which has been the principal object of their labours.

These observations could not be introduced without inconvenience into the body of the reports hitherto submitted; but they hope will nevertheless be considered to come within their proper object of remark.

The Board cannot consider the equipments of the Artillery to have arrived at that stage of perfection in any Country, where it is to be wished that all improvements should stop; but they admit that in proportion as the Government shall incur expense to promote uniformity, it is necessary to provide against mere innovations under the name of improvement.

At present however, the Board perceive no means by which even real improvements could be brought under consideration, with a view to their adoption or rejection ; for it is necessary, that they should be equally applicable to all the Presidencies, and not be adopted from the experience or opinion of one Presidency only.

There is not at present however, any communication kept up on professsional points between the Artillery corps of the three Presidencies, and if it were opened between the authorities who regulate the ordnance details at each; the Board find them so differently constituted that there would be great difficulty in determining the value of any proposal, and a great bar to uniformity of opinion. A complete check (the Board apprehend) is thus offered to anything like improvement even being introduced, and the skill and experience of the officers of the Indian Artillery are liable to be lost to the Departments and to the State.

The Board cannot view the improvements in the British Artillery, which have only of late years been introduced, without connecting it in their minds with the different arrangements, under which they have been elicited in the Royal Service, where there is not only a Committee of scientific and experienced officers, to determine on the final adoption of all proposals, but an officer under the denomination of "Inspector of Ordnance," whose peculiar duty it is to become acquainted with the theory of the construction and uses of every carriage and machine in the Royal Arsenals, and to sift thoroughly, every proposal brought forward by any of the officers, whose experience may suggest alterations, before they are submitted to the decision of the practical Committee.

The Board solicit the attention of Government to this system, and suggest that much advantage may arise from a similar inspection being established at each of the Presidencies; and by the officers conducting it being placed in direct communication with each other. The results of practical experience in Indian warfare, would thus be extended, and improvements when deemed necessary, would receive mature deliberation at each Presidency, previous to being submitted to Government.

As subsidiary to this, the Board would observe to Government, that they consider a Depôt or some establishment for instruction to be an essential requisite. An establishment of this kind hardly exists now at either Presidency. At Madras it is more attended to than at Bengal and Bombay; where indeed it is on so limited a scale, as hardly to answer the purpose of making Recruits acquainted with common Laboratory duty. The variety however of Artillery Machines which are to be used, and the various duties in which Artillery Officers and men may be employed on service, renders it a rare occurrence that they have much opportunity of becoming acquainted with them in the ordinary course of duty; and instruction is therefore more necessary for the Artillery Corps, as a constant practice, even for old Soldiers, than in any other Corps in the service.

To this object the Board perceive that great attention has been paid in the Royal service, which is worthy of imitation, as having promoted in their opinion, the improvements which have been introduced, for each Officer and man having the means in the Royal Laboratory and in the splendid Repository, of being thoroughly instructed in every duty, and the use of every machine, their object is perfectly understood. Whatever knowledge is required is recorded and accumulated there for general information, and the Officers and men of every company returning from long detached duty, have not only an opportunity of renewing their former knowledge, but of becoming acquainted with every thing new, before they can again be employed. These two institutions therefore ensure uniformity, not only in the equipments, but in the duties of the Corps both of which are objects of so much importance to efficiency in the opinion of the Board, as to warrant them in suggesting corresponding establishments for each of the Indian Presidencies.

The Board have in the course of their proceedings, on the Horse Artillery equipments, so fully explained their reasons for retaining (in a school of instruction) a proportion of recruits in excess to what they have proposed as the strength of a Troop, that they need only now add, that the establishment for instruction, in mounted duty, would, they conceive, be appropriately included in the proposed Depot, which being at the Head Quarters of the several Corps, would afford facilities in selecting the Recruits best adapted to this branch of the Artillery, and of instructing all the young Officers as they join, in Horsemanship.

The Board think they cannot too strongly press the subject on the notice of Government, for undoubtedly the nearer the proportion of our Officers allowed for our Field Batteries, approaches the number absolutely necessary to have for them; it is of the greatest consequence, that they should be all qualified to assist in the mounted branch, even was horsemanship unimportant in the Foot Artillery. But the Board think that is has been proved by experience, that in the

Foot Artillery an Officer on service, cannot properly perform his duty to the State unless when mounted, and it cannot therefore be unimportant to Government, that there should be no excuse for want of this necessary acquirement.

The Board observe that in recommending this they do no more than suggest what has been found necessary in the Royal service, where the number of officers for troop and company, is much greater than now exists in India ; and even greater than they propose ; they consider therefore that while it must be productive of equally beneficial results with them, it cannot but be more necessary from their reduced numbers.

(Signed)
J. STEVENSON, Lt. Col. *President.*
J. TENNANT, Lt. Col H. A.
C. GRAHAM, Major H. A.
G. CONRAN, Major H. A.
R. S. SETON, Capt. H. A.
W. WHITLIE, Bt. Captain H. A.

(A true copy.)

(Signed) J. STUART, *Lieut. Colonel,*
Offg. Secy. to the Govt. of India,
Military Department.

FROM
THE SPECIAL BOARD OF ARTILLERY OFFICERS,
To
COLONEL CASEMENT, C. B.
Secy. to the Govt. of India,
Military Department.

FORT WILLIAM, 17*th September* 1836.

SIR,

We have the honor to forward the Report of our Proceedings on Siege Trains; and as soon as completed, a List of Stores and Equipments will follow, we trust the document sent herewith, may meet the approval of the Right Honorable the Governor General in Council.

(Signed)
W. S. WHISH, Colonel, President.
J. STEVENSON, Lieut. Colonel.
J. TENNANT, Major.
G. CONRAN, Major.
R. S. SETON, Captain.
W. WHITLIE, Brevet Captain.

(A True Copy.)

(Signed) J. STUART, Lieut. Colonel,
Offg. Secy. to the Govt. of India,
Military Department.

FORT WILLIAM, *5th September* 1836.

The Board proceed to the consideration of the third point prescribed by the arrangement recorded on the 12th July 1836, namely,

THE ORGANIZATION AND EQUIPMENT OF SIEGE TRAINS.

In further reference to the Minute of the 1st February last, by His Excellency the Commander in Chief, the following communications are read and attached.

1st. From Lt. Col. Sir T. Anburey, C. B. Chief Engineer, Bengal.
2d. From Col. Garrard, Chief Engineer, Madras.
3d. From Lt. Col. Monteith, Madras Engineers.
4th. From Major Ross, do.
5th. From Capt. J. J. Underwood, do.
6th. From Capt. G. A. Underwood, do.
7th. From Capt. J. Oliphant, do.
8th. From Lieut. Green, do.

DESCRIPTION OF ORDNANCE.

For the Equipment of Siege or Battering Trains, the Board conceive the following description of Ordnance the best, viz.

Guns—24 Pdr. Iron, of 9 feet 6 inches in length.
18 „ „ of 9 feet in length.
12 „ „ of 9 feet in length.
Howitzers—8 Inch Iron, General Miller's construction.
24 Pdr. Brass, same as used in Field Batteries.
Mortars.—10 Inch Iron
8 „ „
5½ „ Brass
As in general use both in England and India.

The Board considering that, the weight of the 10 Inch Iron Howitzer of General Millar's construction, and that of the 13 inch Iron Mortar, renders them ill adapted for Siege Trains, and that the difficulty of transporting them would not be compensated by their utility, recommend that the use of these pieces be confined to Forts; and as the 4⅖ Inch brass mortar is a very inferior piece of Ordnance, and quite unnecessary in their opinion, where the 5½ Inch mortar is in use, the Board recommend its being altogether set aside.

The following proportion of different calibers is determined on for Siege Trains of 20, 60, and 96 heavy pieces respectively, with a proportion of Light or Brass Ordnance to each.

	Nature of Ordnance.		Train No. 1 96 Pieces heavy 48 „ light	Train No. 2 60 Pieces heavy 30 „ light	Train No. 3 20 Pieces heavy 10 „ light
Heavy Iron Ordnance.	Guns	24 Pdr. Iron......	24	10	0
		18 „ „	12	10	10
		12 „ „	12	10	0
	Howitzer—8 Inch		12	8	4
	Mortars	10 „	6	0	0
		8 „	30	22	6
Total Heavy Iron Ordnance....			96	60	20
Light Brass Ordnance	Howitzer 24 Pdr. Brass..		12	8	4
	Mortar —5½ Inch „ ..		36	22	6
Grand Total Heavy and Light....			144	90	30

Although the Board have adopted the above proportion of 24 and 18 pdrs. as battering guns, they are of opinion, that it should be optional with the Officer proceeding on Service, to take the whole or such proportion as he may please of either Caliber, and that provision should be made accordingly in Magazines; and they are of opinion that Train No. 3, is the smallest that should be employed on any occasion.

The proportion of Mortars and Howitzers, to Guns, adopted by the Board, is greater than that followed in the Royal Service, from an opinion that the moral effect of shell practice on the minds of the Natives of this country, renders this difference desirable.

In the above statement, the heavy Ordnance only are included in the first total, as followed in the Royal detail of a Siege Train, but the light or brass Ordnance have been added in the grand total, for the purpose of detailing more clearly at one view, the number of Pieces of all Calibers and descriptions employed.

ORDNANCE CARRIAGES.

For the 24, 18 and 12 Pdr. Iron guns, the Board recommend the adoption of the Bengal Gun Carriage and Limber, with the exception of the wheels and Iron axletrees, for which they consider the principle adopted for the wheels of the Field Battery Carriages preferable, viz. Brass naves, and Brass boxes, with the ends of the Iron axletree arms cut for screw nuts.

THE LIMBERS—for all these Carriages to be precisely the same.

THE GUN CARRIAGE WHEELS—to be five feet in diameter, and those for the gun limber 4½ feet, it being understood that the limber or 4½ feet wheels, are invariably to be used with the Gun Carriages when in Battery. The Naves and Nave boxes to be of brass, on the same principle as adopted for the Field Battery Carriages. Diameter of the Nave 14 inches ; length of the Nave box 14 inches.

TIRE—The flat bar Iron for the Tire of these wheels, to be 6 inches broad, and ⅝ of an inch thick.

10 and 8 INCH HOWITZER CARRIAGES—The friction bars to be omitted, as is the case in the Bengal Carriages, and in all other respects to be the same, with the exception of the wheels, which will be precisely similar to those laid down above for the iron battering guns.

LIMBERS—To be precisely the same as those for the Iron battering guns.

MORTAR BEDS—For the 13, 10, and 8 Inch Mortars, the iron beds to be used as sent from England, and for the 5½ Inch mortar, the wooden cheek bed.

SLING CART—To be of the Bengal Pattern, the wheels to be 6 feet 8 inches in diameter, but brass naves to be used instead of wood, and the axle arms to be altered accordingly. The tire to be six inches broad and ⅝ of an inch thick.

SLING WAGGON OR TRANSPORT CARRIAGE.

To have four wheels, and the Bombay pattern to be generally followed for the Body or hind part ; but the hind wheels to be of the same dimensions as laid down above for the Bengal Sling Cart. The Limber or fore part of the carriage to be precisely the same as that now adopted for the iron guns.

With reference to the different experiences of the Madras and Bombay Presidencies, to what has been found sufficient in Bengal, the Committee are desirous of leaving the decision regarding the use of the four wheeled Sling Cart, open to experiment at the former Presidencies.

The Committee are of opinion, that no inconvenience would attend the conveyance of the Gun on its fighting carriage, beyond the probability of requiring some extra spare carriages; with this view they would propose, that a spare carriage should be kept in store for every Battering Gun, and the proportion to proceed on service should be regulated by the Officer fitting out the Train, according to the nature of the country. If on experiment at Madras and Bombay, there is no difficulty experienced in getting on the Gun when mounted on its fighting carriage, should the nature of the country require it, a spare carriage for every Gun might be sent, without increasing the draft cattle at present required for the Train at Madras and Bombay. The four wheel Sling or Transport carriage might thus be discontinued, and the Bengal Sling Cart be substituted in the proportion usual at that Presidency.

MORTAR CARTS.—To consist of a Body and Limber.

The Body of the Cart to be in all respects in point of size, and frame work, the same as the Body of a Light Field Battery ammunition waggon, but to be planked over; and the Limber to be the same as the frame work of the Gun Limber.

THE WHEELS, AXLETREES, &c.—To have Brass naves and boxes, and to be in every way similar to those used with Light Field Battery carriages.

THE MORTAR CART—will carry a 10 inch Mortar, or its bed on the body of the Cart, either weighing about 16½ cwt; so that two carts will be required for every 10 inch Mortar. In this case, the limbers may be lightly loaded with any articles of more bulk than weight.

THE 8 INCH MORTAR—is to be carried on the body of the cart, and its bed on the limber.

TWO 5½ INCH BRASS MORTARS with their beds are to be carried on the body of the cart, and two on the limber.

Store or Forge Cart to be precisely the same as laid down for Field Batteries.

Platform Cart without limber, to be the same as that used at Madras; the load not to exceed 10 cwt.

AMMUNITION.

The Board recommend the following proportion of Ammunition, for the different natures of Ordnance.

For the 24, 18, *and* 12 *Pounder Guns.*

One thousand rounds of round shot per Gun.

One hundred do. shrapnell shells do.

Fifty rounds of canister, and 8 oz. balls for fifty rounds of Grape per Gun, to be made up in bags as required.

For the 8 *inch Howitzer.*

Five hundred rounds of common shells per Howitzer.

Two do do sharpnell do do.

Fifty rounds of canister, and 8 oz. balls for fifty rounds of Grape per Howitzer, to be made up in bags as required.

Ten rounds of shell carcases per Howitzer.

10 *and* 8 *inch Mortars.*

Five hundred rounds of common shells per Mortar.

Ten rounds of shell carcases per Mortar.

10 *Inch.*—Fifty rounds of pound shot, made up as Grape having 100 one pound shot in each round, per 10 inch Mortar.

8 *Inch.*—Fifty rounds of shrapnell shells per 8 inch Mortar, and 50 rounds of pound shot—50 in each round.

5½ *Inch Mortar.*—Three hundred rounds of common shells per Mortar.

Fifty rounds of shrapnell for each Mortar.

Ten do shell carcases do. do.

24 *Pounder Brass Howitzer.*—Two hundred and fifty-six rounds made up of the different natures used with Howitzers for Field Batteries, and in the same proportion for each piece, viz.

Common Shells	84 rounds.
Shrapnell do	96 ,,
Canister	66 ,,
Carcases	10 ,,

Of the above, the same quantity as allowed for Howitzers in a Field Battery will be carried in Ammunition Waggons; the rest will be packed and carried in the mode adopted for Siege Ordnance Ammunition.

Powder for Round Shot for guns, to be calculated at half as much more than required for the number of round shot laid down for each piece, on account of shot that will be recovered.

The Powder for the whole Train, to be carried packed in Barrels, each barrel actually containing either 100 or 50 lbs. of powder, and not as is now sometimes the case, either 90 or 45lbs. only, put into *what are termed* hundred, and fifty pound barrels.

The round shot Ammunition for Guns, to be prepared in the form termed fixed Ammunition, that is, the powder and shot in one bag, divided by a compressed wad made of oakum. All other Ammunition to be loose, or having the cartridge detached from the shot or shell.

SHRAPNELL SHELLS for guns, to be fitted with tin collars.

8 INCH HOWITZER SHELLS both common and shrapnell, to be supplied with grummets, made of rope or oakum, and to be attached when required for use.

CHARGES.—For round shot, shrapnell, and grape, ⅓d the weight of round shot, of Ordnance powder.

For Howitzers and Mortars.

8 inch	Howitzer	4 lbs.	Musketry Powder.	These charges are taken as average charges, and as data for calculation, but will be varied in practice as circumstances require.
10 ,,	Mortar	2 ,,		
8 ,,	,,	1½ ,,		
5½ ,,	,,	¾ ,,		

BURSTING POWDER.

Shrapnell Shells.

8 inch shells	15 oz.	Musketry Powder.
24 pdr. and 5½ inch shells	6 oz.	
18 pounder	5 oz.	
12 pounder	4½ oz.	

Common Shells.

10 inch shells	2lbs.	10 oz.	Ordnance Powder.
8 do. do.	1 „	14 „	
5½ do. do.	0 „	12 „	

The Board recommend, that Fuzes not driven by Artillerymen, and under the superintendence of an Artillery Officer, should not be issued from Magazines to Siege Trains; and that the Officer in charge of a Train should be at liberty to reject all driven Fuzes, when he may have any doubt as to their quality, or their regularity in the rate of burning.

IMPLEMENTS AND STORES.

A general list of Implements and Stores will hereafter be prepared, but at present the Board confine themselves to the discussion of particular articles of equipment.

PLATFORMS GUN. To consist of 20 planks, 10½ feet long, 10 inches broad, and 2½ inches thick, and 8 sleepers, 6 inches by 5 inches thick, two of 17 feet long, and 6 of 9 feet long; to be connected with wooden pins, on the plan at present followed in Bengal; or by rack sticks and lashings agreeable to Colonel Pasley's plan, as may be found best after trial, and if the latter be preferred, an addition of two ribbands 17 feet long and 4 inches square, will be required. Fascines to be used instead of Hurters.

PLATFORMS HOWITZER. The same as the Gun Platform.

PLATFORMS MORTAR, 10 and 8 Inch. To be of 9 Planks, each 6½ feet long 10 inches broad, and three inches thick; and 6 sleepers; 7½ feet long and 6 inches square.

GIN. The Board prefer* the triangular Gin with cog wheels, as now used at Madras, but recommend that a spare set of cog wheels be sent on service with each Train.

* At a subsequent meeting, the handspike Gin was approved of.

Pendulums. The Board recommend the general use of the new Gunner's Pendulums, viz., with a brass arm and weight suspended by a steel spring from a tripod stand, the legs of which can be closed when the pendulum is not in use.

Signal Rockets. A proportion ready made to be carried with each Train. Those intended to be used at night to be headed with *stars*, and those intended for day signals to be what are termed *bounce* rockets, which instead of shewing stars are distinguished by a report.

Blinds Embrasure. To be made of strong 3 inch planks.

Instruments Gunners and Laboratory. To be carried in sets, one set to be packed in a Box of a convenient size, to be taken to the Batteries, and a larger set for the use of the Laboratory in the Park.

The different instruments to be packed in each box, will be detailed in the general list of Stores.

ARTILLERYMEN.

There should be a sufficiency of Artillerymen with all Siege Trains to afford three reliefs, and averaging the number of men required for each heavy Gun, and heavy Howitzer, at 6; and for each Mortar, and light 24 pdr. Howitzer, at 3, the following totals will be required for each of the three Trains proposed, viz.

For Train	No. 1	1944
„ „	No. 2	1224
„ „	No. 3	432

Detail.

Train No. 1.	60 Pieces at 6 each	360
	84 „ „ 3 „	252
	One relief	612
	Two more reliefs	1224
		1836
For Magazine and Laboratory		108
		1944

Train No. 2.	38 Guns at 6 each.......	228
	52 „ „ 3 „	156
	One relief.............	384
	Two more reliefs.......	768
		1152
For Magazine and Laboratory		72
		1224
Train No. 3.	10 Guns at 6 each......	60
	20 „ „ 3 „	60
	One relief..............	120
	Two more reliefs.........	240
		360
For Magazine and Laboratory.........		72
		432

When there are Field pieces allotted to the Army to which the Train is attached, in a proportion not less than three to every thousand fighting men, one of the abovementioned reliefs may be furnished from their details, but when that is not the case, the full proportion of Artillerymen abovementioned will be required.

ESTABLISHMENTS.

Train Artificers should be attached in the same proportion to the number of pieces of Ordnance in each Train, as prescribed for Light Field Batteries, which is agreeable to the present regulations, and in addition to these, the following establishments will be required.

	Sicklegars	Sail Makers	Chucklers	Turners	Coopers.
For Train No. 1	6	6	3	3	6
„ „ No. 2	4	4	2	2	4
„ „ No. 3	2	2	1	I	2

The Battering Train Establishments, are in Bengal now directed to be provided by the Magazine, that furnishes the Train, but this cannot be carried into effect at either of the other Presidencies, (Bombay in fact has no fixed establishments) the Board strongly urge the Train establishments at all the Magazines, being put on such a footing as would ensure every siege equipment required for service, being furnished by them with its train establishment; and in reference to the Store Lascars, the Board are of opinion, that such a body of these should be regularly organized and clothed, as would furnish half the necessary quota, on occasions of Battering Trains being under requisition; at the rate of one to every five carts or hackeries, or to every fifteen loaded bullocks.

The Store Lascars attached to Magazines on this principle, might with advantage, in Bengal, be formed into Companies on the principle already existing at Madras, and Bombay, and a graduated scale of pay as in force at the latter Presidency, according to length of Service is recommended; considering the duties of the permanent Store Lascars, they should the Board think, be entitled to pensions, as has been recommended for the Drivers, and to share in prize money.

CATTLE.

The following number will be required for each description of Carriages.

	Bengal.	Madras.	Bombay.
24 Pdr. and Carriage................	28	44	42
24 „ Spare do....................	12	20	18
18 „ and do.....................	22	38	34
18 „ Spare do....................	12	18	18
12 „ and do.....................	20	30	30
12 „ Spare do....................	12	14	18
8 Inch Howitzer and Carriage........	20	26	30
8 „ „ Spare do..........	14	16	22
Mortar Carts Loaded...............	8	10	12
„ „ Spare...............	6	6	6
Store or Forge Cart................	6	6	6
Platform do.........	4	4	6
24 Pdr. Howitzer and Carriage.......	8	10	12
24 „ „ Spare do...........	6	6	8
Transport or Sling Cart...............	12	14	18

The Bengal rate of draft is the same as that now allowed, except that two bullocks have been added to the draft of the 24 Pounder, and the number of bullocks for the spare carriages of the 24, 18 and 12 Pounders have been reduced to 12 each.

The Madras rate of draft is that now allowed ; and that of Bombay is calculated on the same principle as the draft for the Light Field Batteries, viz., about one half more bullocks than required in Bengal.

At the Madras and Bombay Presidencies, one-fifth of the whole number of Bullocks required for the draft of the carriages, &c. are now allowed as spare, and this is still considered necessary at Madras, but $\frac{1}{6}$ spare is thought sufficient for the Bengal and Bombay Presidencies.

The Board conceive it desirable, that wherever trains are established, at least $\frac{3}{4}$ of the proper proportion of cattle should be kept up on a permanent establishment for those carriages requiring 6 Bullocks or upwards in draft ; leaving the remainder to be furnished from the resources of the country, with country carts when procurable.

The Bullocks should be supplied with one Driver to two Bullocks. They should be formed into Companies of the same strength, as nearly as can be done, with those of the Field Batteries, only spare drivers not being required, all may have Bullocks allotted to them. They should be furnished with an uniform and entitled to pensions ; but not as the Field Battery drivers are, at the expiration of 15 years service, for they may be allowed to become considerably more advanced in years than a Field Battery Driver, say, therefore after 25 years service ; except if they are wounded in the execution of their duty, when they should be entitled to a pension of right.

It would be an improvement on the existing system, that the Bullocks and Drivers should be attached to Magazines instead of being under the Army Commissariat. Conductors of Ordnance might be allowed to have charge of Driver Companies, under the general control of the Commissary, and whenever they were detached with Stores, the Conductors of Ordnance might be sent with their Companies as far as practicable. If Commissaries of Ordnance then, with their Conductors, paid proper attention to the care and feeding of the cattle, they would be kept in much better order than is now usual, or possible for them to be, where the Army Commissariat Officers have no time themselves, and have no assistance except the Natives, which they can apply to this important duty.

But it is by no means intended, that the cattle should thereby be denied to the Army Commissariat whenever they may be required, and to spare. On the contrary, it should be required not only so to employ them, but by any public Officer requiring draft Bullocks ; and it might in fact be an established rule, that any Public Officer should have the use of them for any duty of draft, unless when a certificate was furnished from the Commissary of Ordnance, that there was none available ; or from the Commissary and Commandant of Artillery jointly, when they were refused, owing to their condition or heavy duty otherwise falling to them. Under such a regulation, the Bullocks would hardly ever be idle during peace, and would be scarcely an expense to the State.

For Siege Guns the Board recommend the adoption of the system of exercise in use with the Royal Artillery, as set forth in the recent publication, designated "Instructions "and Regulations for the Service and management of heavy "Ordnance."

RESERVE OR SPARE AMMUNITION.

A supply of spare Ammunition for all Field Battery guns (Horse or Foot) attached to the Army, to accompany the Park, equal in quantity to that laid down, as the field equipment, and packed in like manner in waggons, and an equal quantity to be carried in gross to be made up as required.

RESERVE ORDNANCE AND CARRIAGES, &c.

The Board recommend, that a proportion of Ordnance and Carriages, equal in number and description to those in use with Field Batteries, be kept in the Division Magazines, on which Field Batteries are respectively dependant ; and that one-third the number of Field Ordnance and Carriages attached to an Army, be invariably sent with the park as a reserve.

For Siege Ordnance, the Board recommend a spare set of carriages being kept in magazines, to be issued as required.

(Signed)
W. S. Whish, Colonel.—President.
J. Stevenson, Lieut.-Colonel,
J. Tennant, Major,
G. Conran, Major,
R. S. Seton, Captain,
W. Whitlie, Bt. Captain.

(True Copy,)

(Signed) J. Stuart, Lieut.-Colonel,
Offg. Secy. to the Govt. of India,
Military Dept.

CHIEF ENGINEER'S OFFICE: Fort William,

24th June 1836.

Sir,—In reply to the requisition from the Board of Artillery Officers from the three Presidencies, communicated to me by His Excellency the Commander in Chief through you, under date the 11th Instant; I have the honor to state as follows, to be laid before the Board of Artillery Officers, viz.

Question. " What shall be deemed a proper proportion " of reserve Artillery, and also of what is the requisite " Battering Train, and Engineer's equipment to be kept in " Store?"

The question propounded by His Excellency the Commander in Chief is somewhat of an indefinite nature, since it may be assumed that there is always in store in the Arsenal of Fort William, and in the subordinate magazines in the North West Provinces, materiel for siege equipment including ordnance of all calibers and descriptions, in excess to what can possibly be demanded for any siege; with reference to the present posture of our Power under the existing Government of India.

As to what is the requisite Battering and Bombarding Train and Engineer's siege equipment to be kept in store, I believe that the Arsenal of Fort William, as to every description of Ordnance and Engineers stores and intrenching tools, is amply stored; as are also the magazines of Delhie, Agra, Cawnpore, and Allahabad. I mean of such material as are not liable to deterioration or destruction from long detention in store, incident damage from insects, vermin, and the effects of climate, or such articles as can with little loss of time be made up on demand.

The question as to the strength of a Battering and Bombarding Train of Ordnance, is likewise indefinite, since it must altogether depend on the nature and importance of the service, strength of the place to be reduced, the multiplicity of the works, as well as the nature and system of the fortification to be assaulted, as well as the probable powers, determination, means for, and length of resistance in the besieged.

As most, if not all the forts, or fortified places throughout this country, save some hill places, are constructed of mud with excessively thick ramparts, though not of a regular or modern system of fortification ; probably a much more powerful Train of Ordnance may be deemed requisite or advisable, than against stone, or pucka reveted ramparts ; the general construction of hill forts like those in Rajepootana, including the Shekawattee country ; and most that I have seen in the Deccan are of this description, however I would rather trust to mining against all mud forts.

For Battering of mud forts, a larger Train of Ordnance is required, on account of the thickness and almost impenetrable composition of which the ramparts are constructed, and the consequent greater difficulty in effecting a breach, than on stone and pucka revetments ; and against places of the former description, with the usual very formidable mud walls or ramparts, I would say more dependence is to be placed on the effects of shells and bombardment, combined with mining ; than on guns, for effecting a breach, or the reduction of a mud fortress on the plains.

Major Irvine (with whom I have consulted) would not have more guns against mud forts than against stone ramparts, but trust to mining.

The engineer siege park, stores, and equipment, also depends on the same circumstances which influence the extent and strength of the ordnance train, namely, the extent, strength, and construction of the works to be attacked ; and it would therefore be imperative to have our magazines, especially those in the upper provinces, kept at all times amply stored, and efficiently prepared for every demand with reference to the utmost possible emergency.

Question "as to the calibre which they have found best "suited to the general operations of sieges in India, making "it their object to combine the most effective ordnance, with "sufficient facility of being moved into such positions, as "the attack of the strongest hill forts of the country may re-"quire."

In the sieges at which I have had the honor to serve, with the most careful attention to the relative effects of 24 pounder and 18 pounder shot, (on a mud rampart) I have not been able to come to a correct or decided conclusion, satisfactorily to myself, as to any very considerable comparative advantage of 24 pounders, over the effect of 18 pounders; for after battering a certain time with both, or either, very little increased or sensible alteration in the ruin is perceptible, or any improvement of the breach, the wall becomes pounded into a soft mass, and without apparently at all increasing the debris, which if effected, comes down so very loose and fine as to be nearly an impalpable dust; and the remainder of the wall or rampart subject to no further impression, involving the interment of the shot without any visible advantageous effect.

Under the foregoing observations I should be very indifferent as to the employment of 24 or 18 pounders, at a good breaching distance, and with reference to any required movements of the guns of either caliber from one position to another, I do not think that there is more difficulty in moving a 24 pounder than an 18 pounder, or less facility in their progress on a line of march with able cattle.

I certainly should not care about guns of a caliber above an 18 pounder for Battering, except in cases of difficulty in the selection of ground, for establishing breaching batteries within a reasonable breaching distance, when indeed 24 pounders from their superior range become most desirable for hill fortresses, certainly not from the difficulties of getting heavy ordnance and their ammunition up slopes, and rugged passes, such as hill forts are generally built upon; and as these are almost invariably built of stone walls or defences, guns of a lighter caliber, cannot be efficiently used, although I have seen very good practice with 12 pounders (at Savendroog) and with considerable effect; however, when adjacent positions are available, and heights or ground calculated to admit of heavy ordnance being brought into a position for action, 24 pounders (where 18 pounders perhaps cannot have equal, or the desired effect) may be employed, notwithstanding a little additional trouble or labour may be incurred, with light guns to take off flanking defences, if convenient, positions present themselves.

Major Irvine says "I am strongly in favor of 24 pounders;" Jones in his last edition of his sieges, says, "nothing less than 24 pounders should be used for breaching,' he of course alludes to masonry; against mud forts 18 pounders may do nearly as well as 24 pounders; Major Irvine continues, "I would in all these cases of masonry walls, give preference greatly to 24 pounders over 18 pounders."

I am however of opinion that if batteries of 10 and 8 inch mortars, can be established at a good shelling distance, they would aid the guns, and perhaps they are the most desirable adjunct of any, in the attack of hill defences; 5½ inch mortars are not (from my own experience) to be depended on from their uncertainty, and I consider them next to useless, the only property in their favor is, that, they are easily managed, can be established where no other ordnance can, and from their lightness they cost little trouble in changing their position when required, and are easy also of transportation.

Major Irvine would not set a side the 5½ inch saying "you can often carry them up to positions where they can give great annoyance" in which I concur, but their uncertainty destroys all confidence in their effect.

We have found in several instances, that 12 pounders and even 6 pounders, have proved useful and of beneficial effect at a siege, and can be made available in positions where guns of a larger caliber cannot be used.

After all, it is nearly next to impossible to determine on the strength of a Battering Train, without knowing the service on which it is to be employed, and the contingencies connected with the same, in regard to the time in which it is required that a fortress shall be reduced, with reference to other and combined field operations, and therefore on no account would I be destitute of means for every contingency;

or without a proportion of guns of the highest caliber in every equipment, since 18 pounders can do nothing that 24 pounders cannot, and it must be remarked also, that to make 18 pounders effect what 24 pounders can, a proportionate increased number must be employed. Major Irvine would have as 5 to 4, or as 4 to 3 at the least.

As a matter of reference it may not perhaps be superfluous, to quote the materiel in the ordnance, and Engineer Department in the equipment against Hattrass,* and the ordnance in the field at Bhurtpore;† the detail of the Engineer Siege park at the latter, I regret that I am not able to lay my hand upon, if it is even in existence, which I have reason at this distance of time to doubt, but it was ample, and principally supplied from the Cawnpore, Agra, and Delhie Magazines, as demands were requisite.

I am not aware that any fixed scale can be laid down, sufficiently comprehensive, or correct, to answer every demand for siege materiel, that may according to contingent circumstances, and the nature of the service be demanded, in the Engineer Department, or Siege park; as I have before observed all must depend mainly (if not solely) on the nature and extent of the siege service, and the strength of the Fort or Forts to be invested, and the time that they may hold out.

On the subject of Hill Forts, I have also consulted Major Irvine, whose recent operations and observations on, and acquaintance with, (as far as the plans demonstrate) some of the most formidable I have seen, and which entitles him in my judgment, to a decided preference as to opinion, and information regarding the attack of hill Forts; and he has obligingly afforded me such information as coincides nearly with what I have advanced regarding the Ordnance department; only that he greatly prefers 24 pounders to 18 pounders, in all situations for breaching; he has also kindly furnished me with memoranda of the ordnance he had with him for the Shekawattee‡ service, as also what he had at the reduction of Asseerghur.‡

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* Vide Appendix Nos. 1. 2, 3, an 4.
† Vide Appendix No. 5.
‡ Vide Appendix No. 6.

It may be remarked that in these lists, the 24 pounders are in excess of the lower calibers in one instance, as 3 to 1, and in another as 2 to 1, and at Asseerghur as 3 to 2; but I am nevertheless of decided opinion, that although 24 pounders may cause a greater shock on a stone or brick reveted wall, and accomplish a more considerable downfall, or ruin, at a single shot; yet 18 pounders will against any reveted wall, do generally speaking, all that is required towards bringing it down, and effecting a breach where time is not an object; probably 24 pounders may have greater effect against time, and may bring down larger masses, and when it is of material and serious consequence to effect the object in less time, as on occasions may be desirable, I would give the preference then to 24 pounders.

The facility of movement of heavy ordnance must depend on the strength of hands, establishments, and the efficiency of the draft cattle.

(Signed) T. Anburey, *Colonel,*
Chief Engineer.

Appendix No. 1.

Siege of Hattrass.

The force for this service under the command of Major General D. Marshall, consisted of the following Corps, viz.

Artillery commanded by Major General Sir John Horsford, K. C. B. viz.

European Horse Atillery

Two Troops

European Foot Artillery

4 Companies 2d Battalion, and 3 Companies 3d Battalion.

Golundauze.
Four Companies.
Gun Lascars.
19 Companies, and 14 Companies Ordnance Drivers.

Materiel in the Ordnance Department.

Description.	Guns.		Mortars.			Howrs	Guns.	
	24 pdr. iron.	18 pdr. do.	10 inch iron.	8 inch do.	5⅖ inch Brass.	5⅖ inch do.	12 pdr. brass.	6 pdr. do.
Battering Train........	6	6	8	14	22	0	0	0
Light Field do..........	0	0	0	0	0	0	0	20
Horse Artillery and Gallopers of Cavalry.....	0	0	0	0	0	4	4	10
Total of each caliber.....	6	6	8	14	22	4	4	30
Grand Total of Guns, &c......... 94								

With 1000 rounds of shot per Battering Gun.
do. 200 shells per Mortar.

Field Guns and Gallopers with the usual proportion of made up ammunition with each gun.

N. B.—Four 8 inch howitzers, and eight 24 pounders in addition to the above, arrived in camp from Agra on the 26th February, making the Ordnance in camp 106 pieces.

APPENDIX No. 2.

Engineer's Department with a materiel as follows, viz.

A.	Axes felling with helves complete..........	1000
	do. broad do. do. do.	50
	do. pick do. do. do.	3000
B.	Bags gunny sand calculated for six batteries..	56,000
	Bamboos large for scaling ladders..........	174

	Bamboos small for gabions, stanchions, fascine pickets, &c,		20,000
	Barrows wheel		69
	Baskets hand for earth		12,120
	Billets 1 ft. 6 inches long, and 6 inches square for mines		500
	Bills hand with helves	complete	3300
	do. hooks do. do.	do.	1700
C.	Candles wax	maunds	600
	Chevaux de frise	yards	1000
	Chains measuring	100 feet	10
	do. do.	50 do.	1
	Camp reels with lines complete		5
	Crows iron or crow bars		20
D.	Dubbers country empty, to contain 20 ℔s. powder each		36
G.	Gunny single pieces	pieces	12
H.	Hatchets hand with helves, complete		500
	Hides cow dressed or half dressed		500
K.	Knives Laboratory or Lascars		100
L.	Ladders bamboo scaling, ready made		16
	do. for covering embrasures		30
	Lanterns dark		20
	do. horn		20
	Lines seizing	skeins	1700
	Linen gudgee	pieces	80
	Levels with plummets complete		10
M.	Mallets for driving fascine pickets		500
	Mamoties or Fowrahs with helves complete		3000
	Mantlets double with two wings,		4
	Mattocks with helves complete		44
P.	Petards		2
	Planks saul or mangoe for casing mines		6000
	do. do. for covering batteries, magazines.		32
	Powder ordnance in barrels	℔s.	5000
	Puggaries coarse		6
R.	Rammers earth		632
	Rattans Malacca		35,000
	Rods boring	sets	3
	do. measuring 10 feet long 20		60
	do. do. 6 do. do. 20		
	do do. 4 do. do. 20		
S.	Salt coarse	maunds	300
	Sap forks		20
	do. hooks		20

	Saws crosscut		5
	do. hand		50
	Shovels earth with handles complete		3000
	Slips of white gudgee, or tape, 2 in. wide	yds	3000
	Stanchions 6 feet long, 6 inch square, teak		600
	Stone grinding		1
	Smith's bellows for ventilating mines		2
	Spades iron with handles complete		1000
	Spirits of wine	quarts	12
T.	Tents Laboratory		2
	do. pins spare for marking out batteries		600
	Tools blacksmiths	sets	4
	do. carpenters	do.	4
	do. miners	complete chests	11
	do. do. earth borers	sets	1
	Truck barrows for miners		6
	Tubes bamboo, 4 feet long, each 2 inches diameter to fit into each other for ventilating mines		200
	Twine Moonge	maunds	20 0 0
W.	Wax bees	do.	1 0 0
	Windlass frame, with stanchions, handles, gudgeons, rope, tubs, or buckets, &c. &c. complete		2

Part of the above, was supplied from the Magazine at Agra, and part from Cawnpore, the greater proportion from the latter, and occupied in *carriage* 356 hackeries including *spare* carriage.

APPENDIX No. 3.

Materiel expended against the Kuttera, Ordnance Depart.

Shot round 24 pounders	1074
do. do. 18 do.	1946
Shells 5½ inch	800
Rockets	178

Against the Fort.

Shot round 24 pounders	86
do. do. 18 do.	21
do. Grape 18 do.	5

Shrapnells	12 pounder	54
do.	5½ inch	35
do.	6 pounders	31
Shells of sizes		2400
Carcasses Rockets		400

APPENDIX No. 4.

Materiel expended in the Engineer's department against the Kuttera, or not recovered from the batteries.

Gabions	300
Fascines of sizes	2700
Pickets for fascines	3600

Against the Fort. (Destroyed.)

Gabions	300
Fascines	2500
Pickets	7500

Sand bags brought back damaged to the magazine and returned into store.

(A true copy.)

(Signed) T. ANBUREY, *Colonel,*
Chief Engineer.

APPENDIX No. 5.

SIEGE OF BHURTPORE.

Materiel in the Ordnance Department.

The Artillery detail was afterwards changed as follows, viz; 1000 rounds per gun and 500 shells per mortar.

The ordnance was intended to consist of 60 mortars, from 10 to 5½ inches; 30 battering guns 18 and 24

The ammunition may be rated at 1200 rounds per gun for iron guns, battering

24 Pounder	16
18 „	16
12 „	4
Brass Mortars 13 inch	2
„ „ 10	10
„ „ 8	44
Ordered afterwards from Agra 18 Pdrs.	10

pounders; with 10 heavy howitzers in park; with 600 rounds of shot for each gun, and 400 shells for each mortar and howitzer, a larger equipment by far then we have ever had in the field, except at Hattras, and the Engineer Park exceeded any thing that has yet been in the field; for that department in this country.

(Signed) T. Anburey, *Colonel,*
Chief Engineer.

Appendix No. 6.

Guns at AsseerGhur under Lieut. Irvine,

24 pounders and 18 pounders	21
12 „	7
Mortars and howitzers, caliber not stated	34

JOUDPORE.

24 pounder guns	12
18 „ „	8
10 inch mortars	15
8 „ „	15
5½ „ „	5
8 inch howitzer	5

SHEKAWATTEE.

24 pounder guns	8
18 „ „	4
Mortars of sizes	20

	Agra.			Ajmere.			Delhie.			Saugor.			Cawnpore.			Allahabad.			Total.		
	Established proportion.	Actual proportion in store for service.	Spare.	Established proportion.	Actual proportion in store for service.	Spare.	Established proportion.	Actual proportion in store for service.	Spare.	Established proportion.	Actual proportion in store for service.	Spare.	Established proportion.	Actual proportion in store for service.	Spare.	Established proportion.	Actual proportion in store for service.	Spare.	Established proportion.	Actual proportion in store for service.	Spare.
Beds, mortar cast iron 10 inch..	4	11	7	4	5	1	2	9	7	2	2	0	2	4	2	4	20	16	18	51	33
,, ,, ,, ,, 8 ,,	11	16	5	11	9	0	7	9	2	7	4	0	7	10	3	11	6	0	54	54	0
,, ,, wooden 5½ ,,	11	16	5	11	12	1	7	6	0	7	7	0	7	5	0	11	10	0	54	56	2
Carriages ammn. with limber R P	68	115	47	68	50	0	72	108	36	42	48	6	72	126	54	65	72	7	387	519	132
Carts artificers with limbers.....	8	11	3	8	8	0	9	0	0	4	7	3	6	8	2	7	25	18	42	59	17
,, Platform ,, ,, ...	24	33	9	24	34	10	12	11	0	12	18	6	12	43	31	24	34	10	108	173	65
,, Store ,, ,, ...	22	9	0	22	18	0	16	55	39	11	9	0	13	96	83	21	1	0	105	188	83
Carriages Siege ,, ,, complete 24 pdr. iron gun......	14	22	8	14	10	0	7	12	5	7	7	0	7	11	4	14	29	15	63	91	28
,, 18 ,, ,, ,, ...	14	17	3	14	12	0	7	18	11	7	8	1	7	10	3	14	30	16	63	95	32
,, 10 inch gomer howitzer.	4	3	0	4	4	0	2	2	0	2	2	0	2	2	0	4	3	0	18	16	0
,, 8 ,, ,, ,, ...	7	5	0	7	6	0	4	4	0	4	4	0	4	4	0	7	7	0	33	30	0
,, Transport Medium....	2	8	6	2	2	0	1	8	7	1	1	0	1	6	5	2	1	0	9	26	17
Ordnance iron siege guns 24 pdr.	12	67	55	12	9	0	6	31	25	6	6	0	6	13	7	26	43	17	68	169	101
,, ,, ,, ,, 18 ,,	12	102	90	12	11	0	6	32	26	6	7	1	6	12	6	26	55	29	68	219	151
,, ,, Mortars 10 inch	4	11	7	4	3	0	2	9	7	2	2	0	2	4	2	10	23	13	24	52	28
,, ,, ,, 8 ,,	10	15	5	10	5	0	6	9	3	6	4	0	6	10	4	24	16	0	62	59	0
,, ,, Howitzers 10 ,,	4	3	0	4	2	0	2	2	0	2	2	0	2	2	0	10	3	0	24	14	0
,, ,, ,, 8 ,,	6	5	0	6	4	0	4	4	0	4	4	0	4	4	0	14	5	0	38	26	0
,, Brass siege mortars 5½ ,,	10	23	13	10	5	0	6	18	12	6	7	1	6	12	6	24	13	0	62	78	16
Shells Common 10 ,,	8000	8655	465	8000	6305	0	4000	3011	0	4000	2010	0	4000	2153	0	20000	2173	0	48000	24117	0
,, ,, 8 ,,	16000	17418	1418	16000	13983	0	10000	11904	1904	10000	5270	0	10000	10074	74	38000	27591	0	100000	86240	0
,, ,, 5½ ,,	11000	15499	4499	11000	5491	0	9000	15109	6109	6500	14995	8495	7500	10270	2770	28500	27476	0	73500	89290	15790
,, Spherical 8 ,,	1600	4597	2997	1600	763	0	1000	2961	1961	1000	888	0	1000	776	0	3800	7993	4193	10000	17978	7978
,, ,, 5½ inch or 24 pdr.	3200	2782	0	3200	456	0	4200	6390	2190	1700	1444	0	2700	6688	3988	9500	5915	0	24500	23675	0
,, ,, 18 ,,	1200	876	0	1200	660	0	600	3187	2587	600	450	0	600	4235	3635	2600	1389	0	6800	10797	3997
Shot loose iron 24 ,,	24000	28830	4830	24000	17984	0	12000	25119	13119	12000	8998	0	12000	18379	6379	52000	72992	20992	136000	172632	36632
,, ,, ,, 18 ,,	24000	59294	35294	24000	18589	0	12000	29358	17358	12000	11993	0	12000	30967	18967	52000	80145	28145	136000	230346	94346

N. B.—*The Pieces of Ordnance ready equipped for Service are those which correspond with the carriages in Store.*

To be attached to Sir T. Anburey's, Minute,

(Signed) W. S. Whish, *Colonel.*

To the ADJUTANT GENERAL of the ARMY,

Fort St. George.

Sir,—In obedience to the instructions conveyed to me in your letter of the 28th ultimo, and which but for indisposition I should sooner have replied to, I do myself the honor to state, that as far as my experience teaches me, I consider iron 18 or 24 pounders the most convenient battering guns against those Fortresses in this country, which are revetted with Masonry; in general however, 18 Pounders would be sufficient, and there are many so superficially cased as to be easily breached by iron 12 pounders.

I beg further with deference to suggest, that by a simple moveable contrivance, the carriages of the 18 and 24 pounders might be made to suit either calibre; as it frequently happens in sieges that the carriage of the one is exclusively injured, and that the reverse happens to the other.

The heavy iron 5⅓ inch howitzer, is a most valuable piece of Ordnance against mud forts, the shell acting as a small mine; and would in my opinion, much more speedily effect a practicable breach in ramparts of this description, than the regular battering guns.

As the light field 5⅓ inch howitzers, are well adapted to ricochet batteries, a smaller proportion of the heavy ones for breaching would be sufficient.

Some extra carriages, on a different plan to admit of their serving as mortars against Hill Forts, appear to be desirable, but this will doubtless be a matter for the consideration of the General Committee of Artillery Officers.

(Signed) W. Garrard, *Lieut. Colonel,*
Chief Engineer.

Ootacamund, 14*th April* 1836.

To the ADJUTANT GENERAL of the ARMY.

Sir,—In compliance with the instructions contained in your letter of the 28th ultimo, I have the honor to submit the following observations on the nature of Ordnance I have seen employed; or have understood to be the best adapted for the attack of Fortresses in Asia.

It is exceedingly difficult to combine in one description of Ordnance, the opposite qualities which are required in the attack of Fortresses, often differing both in the materials of which they are built, and the construction as relates to profile, and general plan; the means of transport is also frequently limited, and requires to be reduced to the least possible quantity.

Was the question simply to bring down a certain quantity of wall in a short time, I would have no hesitation in preferring the iron 24 pounder Guns, to any other of the same or inferior Caliber, of this I had a good example during the operations of the force employed in the Persian Gulf, during 1820, under Sir William Kerr.

It was necessary to reduce a very strongly built stone fort, about 400 yards in front of the town of Ras-al Khenia. The Batteries were distant 350 yards from the work, and consisted of four 18 pounders Brass, worked by the Bombay Artillery; and three 24 pounders landed from His Majesty's Ship the "*Liverpool*" and worked by the seamen. • The three 24 pounders effected a breach in a shorter period than the four 18 pounders, and the absolute weight of shot fired was less. The practice was excellent from both Batteries. Though the object was accomplished by both, the advantage was decidedly in favor of the 24 pounders, and the result was the same on two other occasions. The distance to be conveyed was not above a mile, and the 24 pounders taken on sling carts (having only ship carriages) were transported with greater ease than the 18 pounders on their own. The country a deep sand.

For taking off the defences, and ruining parapets of the common Fortresses, which are generally much weakened by loop holes, I have found 12 pounder Guns either Brass or Iron sufficient, and though they may also answer to breach stone walls, the doing so with them is tedious, and the expenditure of shot, if even the difference of weight is taken into consideration, excessive.

Regarding the difference of transport between the 24 pounders and 18 pounders, I have always found when the Guns are conveyed on their own Carriages, the wheels of both, and even the 12 pounders are quickly ruined; particularly when the ground is rocky, the jar in descending a hill or ravine is excessive, and frequently occasions breaking down, to the great delay and inconvenience of the whole Park and rear Guard. In deep ground 500 men are hardly able to bring a Gun forward. In such a case the 18 pounder would have a decided advantage over the 24. As however there is no necessity for the Gun being mounted on its own Carriage, which after a long march will certainly be unserviceable, the small extra expense of having the Guns conveyed on sling carts, and the Carriages separate, will be amply repaid by the additional facility of conveyance, and the perfect order in which the Guns will arrive at their destination. The load is also nearly divided.

A certain number of cattle can only act simultaneously, and an equivalent object is not gained by increasing this beyond a given point. The Guns would thus be able to move over ground which in the present state of transport would either be impracticable, or require the aid of the whole troops, who would be kept out for a much longer time, suffer much extra fatigue, and possible sickness.

Besides the reasons already assigned, I consider it a great advantage to reduce the number of different kinds of Guns and stores as much as practicable. Should 24 pounder Guns be adopted as the besieging Train, the 24 pounder howitzer which is far superior to the 18, might be employed in the Enfilading Battery, and the same description of shot and shells answer for the whole.

The last mentioned piece of Ordnance, might frequently be employed in the reduction of Posts where the walls are of stone, high and much loopholed, and consequently weak. When in Persia, Abbas Mirza directed me to cast four short 18 pounders, and two 24 pounders of the lightest construction, which were nearly on the same model but a little longer (5 ft. 4 ins.) They proved sufficient to breach Byazeed, Toprak, Cullah, Argis, and several more Curdish Castles. They were ultimately captured by General Paskawitch in the city of Tabreez, and taken by him into Turkey on his advance to Erzerom. They were found very useful in the attack on Akheska and Akelkelik, were also frequently put in position in general actions, and mentioned by him as excellent Guns.

8 inch Mortars are the largest Caliber I think necessary to be used in Asia, where there are few or no bombproofs or Magazines. The 5½ inch are also excellent for causing alarm, and burning the mat huts of an Indian Town. In Europe, besides these, a very small Mortar, 4½ inch and less has been much employed, and found very useful in driving the garrison from entrenchments in the covert way, from behind palisades &c. They are so light, a man carries and places them in any part of the trenches, they throw shells with considerable exactness to a distance of 150 yards, if the wind is not too high. They are particularly useful to drive men from broken ground immediately without the works; I saw them used with great advantage in the attack of the Emperor's Fort near Algeris, the Arabs were dislodged from the hedges and vineyards, at the base and sides of the hill on which the Forts are built. A number of very light mountain Guns were also placed at the angles of the trenches, and entirely masked during the day or till the moment of opening their fire. They saved the great waste of Musket Ammunition which so frequently occurs in Sieges. Two hundred marksmen with wall pieces and long Rifles, were the only troops allowed to fire without express orders, and the enemy having advanced to within a marked distance.

If the option was left to me, my selection of Artillery for a Siege would be.

24 Pdr. iron guns for batteries.
24 ,, ,, Howitzers for enfilade, and defence of the lines
12 ,, ,, Guns, or 6 feet brass, to keep under the, enemy's fire, and take off the defences.
8 inch mortars
5½ ,, ,,

and a number of 4 or 4½ to be employed as before stated.

The same shot and shells would thus answer for three pieces and be employed as occasion might offer.

(Signed) W. MONTEITH, *Lt. Colonel,*
Supg. Engineer, P. D.

FORT ST. GEORGE, 11*th April* 1836.

To the ADJUTANT GENERAL of the ARMY.

Sir,—In obedience to the orders contained in your letter of the 28th ultimo, I have the honor of enclosing a report on the Caliber and description of Ordnance best suited to the general operations of Sieges in India.

(Signed) A. Ross, *Major*,
Inspt. Genl. of Civil Estimates.

Madras, 13*th April* 1836.

Report on the Caliber and description of Ordnance best suited to the general operations of Sieges in India.

The following Table shews I believe, nearly the weight of the pieces, their carriages, shot, shell, &c., of the different Siege Ordnance used in the Madras Presidency; and it is proposed to consider each with reference to the effect it will produce on a fortification, and to the cattle it will require for its transport. In the Southern parts of India this latter consideration is important. We have few navigable rivers of which advantage can be taken for the transport of a Battering Train; the state of the roads is not generally good, and it is therefore most desirable to use in sieges, as light a description of efficient Ordnance as possible.

Table of weight of Siege Ordnance and Ammunition.

Nature of Ordnance.	Weight of			
	Piece.	Carriage.	Limber.	Shot or Shell.
	cwt.	cwt.	cwt.	lbs.
Iron Mortars.				
13 inch and its bed	69½	0	0	198
10 ,, ,, ,,	33	0	0	98
8 ,, ,, ,,	16	0	0	44
Brass Mortars.				
5½ inch and its bed	2½	0	0	15
4⅖ ,, ,, ,,	1½	0	0	8
Iron Howitzers.				
10 inch	40	29½	7⅓	0
8 ,,	21	22	7⅓	0
Iron Guns.				
24 Pounder 9 feet	48	30	16	24
18 ,, 8 ,,	38	24	15	18
12 ,, 8 ,,	30	22	13	12

A 13 inch Mortar requires more than twice the quantity of cattle to draw it than a 10 inch one does, and more than four times what an 8 inch does. The weights of the 13, 10, and 8 inch Mortars and of their shells are rather above the proportions of 4, 2, 1; so that the cattle required for drawing one 13 inch Mortar and a specified number of rounds of its Ammunition, will draw two 10 inch Mortars, or four 8 inch Mortars with the same number of rounds for each.

The unwieldiness of the 13 inch Mortar, its excessive weight and that of its shell, which is quite beyond the power of one man to manage conveniently, are insuperable objections to its being used in Indian Sieges; the only case in which it might be necessary to have a few of these heavy pieces in a Siege Train, is, when the place to be attacked is known to have extensive and strong bombproofs.

With regard to the 10 and 8 inch Mortars, the latter weighs rather less than half the former, and it can scarcely be doubted that two 8 inch shells would be generally more effective than one 10 inch, except therefore in the attack of places which have extensive bombproofs, 8 inch Mortars are probably the largest required.

With regard to the 5½ and 4⅖ Mortars, and they are useful and handy pieces, their shells can be used for 24 and 12 pdr. Guns. They should be continued unless it be proposed to use 18 pdrs. in breaching Batteries to the excluson of 24 pdrs., in that case, a Mortar should be introduced which will discharge a shell and spherical case shot of the same diameter as the 18 pdr. It is advantageous to have classes of Guns, Howitzers, and Mortars of the same Caliber, and it is important to be able to fire shells from breaching Guns. When in breaching, the escarp has fallen, shot do little more than bury themselves in the earth of the rampart, whereas each shell then thrown in produces the effect of a small mine.

With regard to the 10 inch and 8 inch Howitzers, the reasons given in favor of the mortar of the latter Caliber are applicable to this species of arms.

The 24 pdr. is an extremely unwieldy Gun, and weighs ½ a ton more than the 18 pdr. but it is more efficacious in forming a breach. The momentum with which the 24 pdr. and 18 pdr. strike an escarp, will be as its weight multiplied by its velocity; supposing therefore the velocity in both cases equal, the effect will be as 4 to 3, or as 8 to 6, while the ratio of weight of the two Guns and their Carriages will be about 8 to 5, an advantage rather in favor of the 18 pdr. This Gun has also that of being handy enough for enfilading, or counter batteries, and heavy enough for breaching ones, and when the former are masked by the latter, it can be removed from one to the other, and thus be brought into play during every part of the Siege, which is not the case with any other piece of Ordnance. It is certainly sufficiently heavy to batter within a distance of 350 yards any Masonry to be found in India. The 12 pdr. is well adapted for enfilading and counter-batteries, but unfit for battering in breach. At Jaulnah, it was used, but the escarp battered was high, and its section very slight. The weight of a 12 pdr. is $\frac{16}{19}$ that of the 18 pounder, and I think it can hardly be questioned whether for the general purposes of a siege in India, sixteen 18 pdrs. would be much more useful than nineteen 12 pdrs.

The result drawn from the foregoing observations is, that for Mortar and Howitzers in Indian Sieges generally, 8 inches is the largest Caliber required; that 18 pounders may be used during the whole Siege for arming effectually each kind of battery, and that if the 24 pounder be given up, a shell to fit the 18 pdr. should be substituted for the $5\frac{1}{2}$ inch one.

(Signed) A. Ross, *Major,*
of Engineers.

MADRAS, 13*th April* 1836.

To the ADJUTANT GENERAL of the ARMY.

Fort St. George.

SIR,—I have had the honor to receive your letter of the 28th ultimo, and in obedience to the instructions therein contained, forward my humble opinion of the subject submitted to my consideration, for the information of His Excellency the Commander in Chief, and the authorities at Calcutta.

Before giving a statement of the description of Ordnance I consider as best suited for Sieges in India, I think it advisable to enter into a few remarks relative to some of the operations, I have had the honor to be employed in during my service in the field; and which will I trust bear me out in the conclusions I have come to on this subject.

The largest caliber guns with the Battering Train attached to the 2nd Division of the Army of the Deccan, were 18 Pdrs. Four of this description of Ordnance, a couple of brass 12 Pdrs. a few light 6 Pdrs. and two or three mortars of the smallest caliber, were all the Park allotted to the detachment under the command of Lieut. Colonel A. McDowell employed in the reduction of the fortresses in Candeish.

This weak *materiel* at times, cramped our operations very considerably, and was particularly felt at the siege of Malligaum, where the difficulties and obstacles we encountered, were mainly owing to the inefficiency of our Ordnance.

Had we possessed even two 24 Pdrs. in addition to the 18 Pdrs. a powerful effect in a comparatively short time would have been made on the walls of this fortress; instead of this, we were only able after four and five days incessant firing, to make an imperfect breach; the result of this continued and constant practice, was the destruction of our Guns, all of them having run at the vent, and some to such a degree as to oblige us to serve the vents latterly with sand bags.

The *brass* 12 Pounders, were of little use in the breaching Battery, and might have been dispensed with.

Iron 12 Pounders would have been, and are a very useful piece of Ordnance, particularly for enfilading, and should always constitute a portion of a Field park.

The arrival of the Bombay Battering Train before Malligaum, put us in possession of some mortars of large caliber, and in three hours after they were placed in Battery and had opened their fire, the Fort was blown up.

In addition to the reasons I have above stated, I am induced to recommend the 24 pdr. as a principal piece in the Siege Train of Artillery, for it has been found that a most destructive effect is produced to a mud wall or tower, by firing live shells into it. The 24 pdr. will carry the 5½ inch shell very well, and is therefore admirably adapted for this service. Moreover the difference in weight, and the consequent Carriage of this description of Gun is not so very great, in reference to the 18 pounder, which has been so exclusively used by our army in the late war. The field complement of draft bullocks for the latter, being 46, and for the former 53.

This much I have deemed it advisable to state, to shew how necessary I consider Ordnance of large caliber are for the reduction of strong fortresses on the plain.

It is only necessary for me now to point out the great advantages we derived from the smaller description of Artillery in our attacks of the *Hill Forts.*

For the success attendant on the sieges of the hill forts, we were indebted more to the impression of our operations on the *minds* of the Garrisons, than to any decisive effect we produced by *our fire on their defences.* At these places, we found our Ordnance of small caliber of the greatest service, we were enabled to transport the light 6 Pounders (after dismounting them) to the advanced and elevated positions, it was considered from time to time necessary to occupy. In such operations Guns of large Caliber would have been of no use; and it might be truly stated do frequently more harm than good, for in many of the hill forts in the Deccan, the only ingress is by a tunnel, through the perpendicular scarp of the rock; which entrance is defended by a slight work thrown up in front, battering and breaching this, adds to, rather than diminishes the difficulties of approach, as we found upon taking possession of the hill forts of Rajdeir and Trimbuck, at both these places we had carried our operations to the extreme point we could advance, and had the Garrisons held out and not yielded through the alarm we had instilled into their minds, by bringing up our small Guns, and placing them into Battery, so near to the scarp of their upper Fort, nothing further could have been effected by us to obtain an entrance, and we must have contented ourselves with the *investiture* of the places.

The 12 *Pounder Brass Howitzer* I consider a most serviceable piece of Ordnance for operations against hill forts, for this gun weighing but little more than the 6 Pounder, could be transported with as little difficulty, and with as great advantage, as the latter useful piece of Artillery.

From all I have experienced, and in reference to the sentiments I have above expressed, I am led to the following conclusion.

A force taking the field for any extensive siege operations, should be furnished with a Battering Train composed of 24 *Pdrs.* 18 *Pdrs. iron* 12 *Pdrs.* 10 *inch Mortars,* 5½ *inch Mortars,* 12 *Pdrs. Howitzers,* and *light* 6 *Pdrs.*

A proportion also of *hand grenades* should always be added to the Ordnance stores, with each force as being a most annoying and terrifying missile, against a native enemy.

The heavier description of Guns enumerated above may be I think dispensed with, when the operations are confined to hill forts.

(Signed) J. J. UNDERWOOD,
Captain of Engineers.

Arcot, 9*th April* 1836.

To The ADJUTANT GENERAL of the ARMY,

Fort St. George.

Sir.—I, have the honor to inform you, that owing to absence on leave from my station, your communication dated 28th March 1836 transmitting an extract from the Secretary to the Government of India, relative to the subject of Ordnance best suited for Indian warfare, reached me only a few days ago. I beg now to state in reply, that since my arrival in India no sieges have been carried on by the Madras Army, and that I feel myself quite incompetent to assert from experience, what may be the description and caliber of Ordnance best calculated to breach fortresses. In the more active and desultory warfare which I have seen, such as Ava and Coorg, the 12 pdr. howitzer appeared to me a most efficient and powerful gun, transported without difficulty, and not easily upset on the worst of roads.

The lighter howitzers and field pieces are in my opinion seldom found to be of much general use, though small handy mortars carried by men through jungles, have frequently been highly serviceable and advantageous. The employment of grenades in India, I am convinced, would be of the greatest benefit, and if some simple instrument for projecting them 80 or 100 yards could be adopted, they would prove very destructive and valuable. My attention has for some time past been directed to this last point, and from the rough experiments I have been enabled to make, I am confident that steel bows or some expedients of this nature may be successfully applied. Grenades may be carried and used where no other species of Ordnance can be moved. The 18 pdr. battering gun, I venture to think, ought to be entirely discarded, and iron 12 and 24 pdrs. alone depended on for sieges, as 5½ and 4⅖ inch shells, or spherical case shot, may be thrown from the latter, while the shell fit for an 18 pdr. will not I am informed, suit the bore of any mortar in the service. The 8 inch mortar possesses so many advantages over the 13 and 10 inch mortars, and withal, as far as I have seen repeatedly, carries so truly to great ranges, that for ordinary purposes I think it preferable to any other. Two 8 inch shells with their ammunition, weigh less than one 10 inch shell, and their effect may perhaps be greater.

(Signed) G. A. Underwood, *Captain,*

Commanding Sappers and Miners

Bangalore, 16*th* *April* 1836.

To The ADJUTANT GENERAL of the ARMY,

Fort St. George.

Sir,—Agreeably to the orders of the Commander in Chief, communicated to me in your letter of the 28th March, I have the honor to forward for His Excellency's information, my opinion as to the description and caliber of Ordnance best suited to the general operations of sieges in India.

(Signed) J. Oliphant, *Captain,*
Madras Engineers.

Engineer's Office, H. S. F.
Secunderabad, 13*th April* 1836.

Memorandum on the description of Ordnance best adapted for sieges in India.

18 pdr. guns sufficiently powerful for breaching.

There is no fortress that I have seen in India, whether of masonry or mud, against which I should consider it necessary to employ guns of a greater calibre than 18 pdrs. Where the walls are of masonry if they are exposed sufficiently low, 18 pdrs. will readily effect a breach, when the batteries are established at the distance of 250 or 300 yards. If the walls are covered by a glacie the batteries must necessarily be advanced to its crest to accomplish the desired object.

If the Fort be a mud one, and a breach cannot be effected by 18 pdrs. in consequence of the shot merely burying themselves in the mud, I doubt if 24 pdrs. would produce a better result. Under such circumstances (but I believe them to be rare) recourse must be had to live shells, or to mining.

I know that Colonel Jones says "for direct fire or breaching, no gun of less caliber than a 24 pdr. should be used." and that Colonel Paisley says "the 12 pounder is unfit "for breaching;" yet I think that both of these opinions are inapplicable to Indian sieges, and that in all cases the

The iron 12 pdrs. in many cases will be powerful enough.

18 pdr. will be found ample, whilst in many the 12 pdr. will answer every purpose. Both these guns the iron 18 and 12 pdrs. are well adapted for enfilading.

The brass 12 pdr. not approved of.

The Brass 12 pdr. was frequently used during the operations of 1817-18, but seldom without opening at the vent, and drooping at the muzzle. It may I think be safely laid aside.

The 8 inch mortar considered sufficiently heavy for all purposes.

With regard to mortars, as the faces of but few Indian fortifications are provided with traverses, and as bombproofs so called, are rarely so in reality, even where such kind of building exists at all; it appears to me that the 8 inch mortar is of weight sufficient to answer every purpose, and when the very great difference between its weight, and that of a 10 inch mortar is taken into consideration, it may become a question whether the use of the latter ought not to be discontinued.

Colonel Jones in note 51 of his sieges, says; "It is submitted to the Artillery Officers, whether it be desirable to "make so much use as hitherto, of the larger mortars in "the bombardment of Towns, as the expense and carriage "of their ammunition is so very great, and an 8 inch shell "has a momentum sufficient to penetrate through the roof "of any buildings, or even through the arch of any moderate "cellar or other usual hiding place of the inhabitants; so "that the 13 inch or 10 inch mortars, can seldom be necessary, except where shipping, casemates, sluices, or military works, are to be destroyed."

Colonel Paisley remarks "If the chief object of the fire "of mortars in a siege, were to break down and destroy "bombproofs or substantial buildings by repeatedly falling "on them, the 13 inch mortar from the great momentum of "its shell would be by far the most effective, but the explosion of a Powder Magazine in a fortress rarely takes place, "and when it does, it is more often occasioned by accident, "than by the premeditated fire of the besiegers."

The 5½ inch mortar will always be found useful, but particularly in the attack of hill forts, where they may be placed by hand in positions inaccessible to mortars of large caliber.

The little Coehorn mortars were found of great use at the siege of Antwerp in the end of 1832, and were very annoying to the besiegers ; in the journal of that siege are the following paragraphs regarding them.

" Le feu des mortiers à la Coehorn de l'ennemi incommo-" dant beaucoup les travailleurs, on jugea convenable de le " combattre avec des armes semblables." Again, Le nombre " des mortiers à la Coehorn employés dans l'attaque fut aug-" menté ; un détachment de la 6e batterie du 8e régiment, " commandé par un Officier, fut spécialement chargé du ser-" vice de ces bouches à feu, qui, d'après les indications de " l'officier supérieur du génie de tranchée, étaient transportées " dans les boyaux et les sapes les plus avancées et protege-" aient les travailleurs."

Colonel Jones, says regarding them, " that he saw the " Prussians firing from their trenches before Mauberge, " from mortars of $4\frac{2}{5}$ inches on the morning after breaking " ground. The mortars were placed on the bottom of the " trench (a firm gravel) without platforms, and were throw-" ing a succession of shells with apparent good effect into " an advanced lunette, from which a musket shot only was " occasionally returned. There can be no doubt that porta-" ble mortars used in such manner, would prove highly ser-" viceable at various points of an attack, and it is strongly " recommended that they should form part of every batter-" ing train." Colonel Paisley says " all mortars are an-" noying to an enemy, even Royals and Coehorns, for shells " weighing 16 or even 8 lbs. are not to be despised." After the above quotations it may be almost superfluous to add, that the Coehorns where properly applied, must be still more suitable for Indian than for European sieges.

The howitzers in use in the war of 1817-18 were the 8 in. $5\frac{1}{2}$ heavy, $5\frac{1}{2}$ light ; the $5\frac{1}{2}$ light was considered almost useless from its want of precision, but the two former are good pieces, particularly the 8 inch, though its weight is against it, and I believe at Madras it is now obsolete in consequence. I have not seen the iron howitzers invented by General Miller, which in Colonel Jones's

The 8 inch and $5\frac{1}{2}$ heavy howitzer good, but will probably be laid aside for the 8 inch iron howitzer invented by General Miller.

opinion "will in future sieges be the principal weapons for enfilade fire." But beg to call attention to an 8 inch brass howitzer of new construction, which seems to have produced the most powerful effects at the siege of Antwerp, and which Captain Straith in his compilation on fortification (misled by the besieged General's report) mistakes for one of General Miller's, he says, "The new features "in this siege in the Artillery Depart- "ment were 1st. The tremendous "effects of the new long howitzers." (introduced into the French service, by General Paixhans and into the English service by General Miller) "the practice of which is well known "and highly appreciated by the British and French Artil- "lerists."

An 8 inch brass howitzer of new pattern adopted by the French on the recommendation of their Artillery Committee.

General Chassè writes to the Minister of war for Holland, as follows.

"Dés le point du jour, le feu de l'ennemi commence avec "la même violence qu'heir, et beintôt ou voit, par le résultat, "que l'ennemi se servait contre nous de pièces de nouvelle "invention dites *à la Paixhans*, a la force desquelles rien "ne peut résister, et qui causent de grands ravages aux "bâtiments et aux blindages, &c. &c." A note appended by the author of the Journal; points out the General's error.

"Il n'a pas été employé au siége de canons à bombes de "l'invention de M. le Colonel Paixhans; les bouches à feu "que M. le General Chassé désigne ainsi, per erreur, sont "les obusiers de 8° en bronze, noveau modèle, adopté en 1829 "sur la proposition du comité de l'Artillerie."

In the Journal the writer observes of their own fire.

"On remarqua surtout la justesse du tir obusiers de 8°, noveau modéle."

It may be worth enquiring what this new pattern is; perhaps some officer recently returned from Europe may be able to explain what are the improvements which have produced so much greater precision and effect. The devastation caused by these howitzers according to General Chassé was tremendous.

Hand Grenades.

The utility of hand Grenades has been often questioned, when I saw them used, they did not seem to cause much annoyance to the besieged, but were at times detrimental to our people by splinters coming back, and also by the men exposing themselves when throwing them ; but as there may be situations in which they might be useful, perhaps it would be better that they should be considered part of the materiel requisite for a siege.

Recapitulation of the Ordnance which appear to me sufficiently powerful, to produce the effect required, and sufficiently moveable to be placed in the positions which it may be fonnd necessary to occupy in the attack of the fortresses of India.

Guns.	Iron 18 Pounders. do. 12 do.	both for breaching and enfilading.
Howitzer	Brass 5½ inch heavy.	
Mortars	8, 5½ and 4⅖ inch.	

(Signed) J. Oliphant, *Captain,*
Madras Engineers.

To the ADJUTANT GENERAL of the ARMY.
Fort St. George.

Sir,—In reply to your letter of the 28th ultimo, I have the honor to state for the information of His Excellency the Commander-in-Chief, that as no fortresses have been reduced or defended by the Madras Army since I entered the service, I am without practical experience on the subject therein called for, and I do not think it would be proper for me under these circumstances, to offer an opinion which I may have formed from the experience of others, or from books which are accessible to every body.

(Signed) C. Green,
Supg. Engineer in Mysore.

Supg. Engineer's Office in Mysore,
14*th April* 1836.

(True Copies)

(Signed) J. Stuart, *Lt. Colonel,*
Offg. Secy. to the Govt. of India.
Military Department.

Proceedings of the special Board of Artillery Officers—continued.

AMMUNITION.

TABLE No. 1, *Shewing the quantity of Ordnance and Musketry Powder for one piece of Ordnance of each nature, composing Siege Trains, and the purposes for which required.*

Nature of Ordnance.	Charge.			For what.	No. of Rounds.	Total quantity of powder					
						Ordnance.			Musketry.		
	lbs.	oz.	drs.			lbs.	oz.	drs.	lbs.	oz.	drs.
24 Pdr.	8	0	0	Round Shot......	1000	8000	0	0	0	0	0
"	8	0	0	Do. recovered	500	4000	0	0	0	0	0
"	8	0	0	Shrapnell........	100	800	0	0	0	0	0
"	8	0	0	Canister Shot.....	100	800	0	0	0	0	0
"	0	6	0	Bursting Shrapnell	100	0	0	0	37	8	0
"	0	1	0	Priming.	1700	0	0	0	106	4	0
				Total for one Gun	....	13.600	0	0	143	12	0
18 Pdr.	6	0	0	Round Shot......	1000	6000	0	0	0	0	0
"	6	0	0	Do. recovered	500	3000	0	0	0	0	0
"	6	0	0	Shrapnell.........	100	600	0	0	0	0	0
"	6	0	0	Canister Shot.....	100	600	0	0	0	0	0
"	0	5	0	Bursting Shrapnell	100	0	0	0	31	4	0
"	0	1	0	Priming.	1700	0	0	0	106	4	0
				Total for one Gun	....	10.200	0	0	137	8	0
12 Pdr.	4	0	0	Round Shot......	1000	4000	0	0	0	0	0
"	4	0	0	Do. recovered	500	2000	0	0	0	0	0
"	4	0	0	Shrapnell........	100	400	0	0	0	0	0
"	4	0	0	Canister Shot.....	100	400	0	0	0	0	0
"	0	4	8	Bursting Shrapnell	100	0	0	0	28	2	0
"	0	1	0	Priming.	1700	0	0	0	106	4	0
				Total for one Gun	....	6800	0	0	134	6	0
10in. mr.	2	0	0	Common Shells ..	500	0	0	0	1000	0	0
"	2	0	0	Carcasses.........	10	0	0	0	20	0	0
"	2	0	0	Pound Shot.......	50	0	0	0	100	0	0
"	2	10	0	Bursting com. shells	500	1312	8	0	0	0	0
				Total for one 10 in. [Mortar.	....	1312	8	0	1120	0	0

Nature of Ordnance.	Charge.			For what	No. of Rounds.	Total quantity of powder					
						Ordnance.			Musketry.		
	lbs.	oz.	drs			lbs.	oz.	drs.	lbs.	oz.	drs.
8in.mr.	1	8	0	Common shells . . .	500	0	0	0	750	0	0
,,	1	8	0	Shrapnells.	50	0	0	0	75	0	0
,,	1	8	0	Carcases.	10	0	0	0	15	0	0
,,	1	14	0	Bursting com. shell	500	937	8	0	0	0	0
,,	0	15	0	Bursting shrapnell	50	0	0	0	46	14	0
				Total for 1,8 in. M.	....	937	8	0	886	14	0
5¼in. mr.	0	12	0	Common shells. ..	300	0	0	0	225	0	0
,,	0	12	0	Shrapnell	50	0	0	0	37	8	0
,,	0	12	0	Carcases	10	0	0	0	7	8	0
,,	0	12	0	Bursting com. shell	300	225	0	0	0	0	0
,,	0	6	0	BurstingShrapnell.	50	0	0	0	18	12	0
				Total for1,5½ in.M.	....	225	0	0	288	12	0
8 in Hr	4	0	0	Common shells. ..	500	0	0	0	2000	0	0
,,	4	0	0	Shrapnell...	200	0	0	0	800	0	0
,,	4	0	0	Canister.	100	0	0	0	400	0	0
,,	4	0	0	Carcases	10	0	0	0	40	0	0
,,	1	14	0	Bursting com. shell	500	937	8	0	0	0	0
,,	0	15	0	Bursting shrapnell.	200	0	0	0	187	8	0
,,	0	1	0	Priming.....	810	0	0	0	50	10	0
				Total for I, 8 in H.	....	937	8	0	3478	2	0
Brass 24P.H.	2	0	0	Common shells. ..	84	168	0	0	0	0	0
,,	2	0	0	Shrapnell.........	96	192	0	0	0	0	0
,,	2	0	0	Canister.	66	132	0	0	0	0	0
,,	2	0	0	Carcases	10	20	0	0	0	0	0
,,	0	12	0	Bursting com. shell	84	63	0	0	0	0	0
,,	0	6	0	Bursting shrapnell.	96	0	0	0	36	0	0
,,	0	2	0	Priming.	256	0	0	0	32	0	0
,,	2	0	0	Spare charges....	32	64	0	0	0	0	0
				Total for 1, 5½ in. or 24 Pdr.		639	0	0	68	0	0

AMMUNITION TABLE No. 2.

Shewing the total quantity of powder required for the whole train.

TRAIN No. 1.

Nature of ordnance	Quantity of powder required for one piece of each nature.						Number of pieces of each Nature.	Quantity of powder required for the total number of pieces of each nature in a Train.					
	Ordnance.			Musketry				Ordnance.			Musketry.		
	lbs.	oz.	drs.	lbs.	oz.	drs.		lbs.	oz.	drs.	lbs.	oz.	drs.
24 pounder iron...	13.600	0	0	143	12	0	24	326.400	0	0	3450	0	0
18 " "	10.200	0	0	137	8	0	12	122.400	0	0	1650	0	0
12 " "	6.800	0	0	134	6	0	12	81.600	0	0	1612	8	0
10 inch mortar iron	1,312	8	0	1120	0	0	6	7.875	0	0	6720	0	0
8 " " "	937	8	0	886	14	0	30	28.125	0	0	26.606	4	0
5½ " " brass	225	0	0	288	12	0	36	8.100	0	0	10.395	0	0
8 " howzr. iron	937	8	0	3478	2	0	12	11.250	0	0	41.737	8	0
24 pdr. " brass	639	0	0	68	0	0	12	7.668	0	0	816	0	0
Total...	34.651	8	0	6257	6	0		593.418	0	0	92.987	4	0

TRAIN No. 2.

24 pdr. Iron Gun...	13.600	0	0	143	12	0	10	136.000	0	0	1437	8	0
18 " " "	10.200	0	0	137	8	0	10	102.000	0	0	1375	0	0
12 " " "	6.800	0	0	134	6	0	10	68.000	0	0	1313	12	0
8 inch iron mortar	937	8	0	866	14	0	22	20.625	0	0	19.071	4	0
5½ " brass "	225	0	0	288	12	0	22	4.950	0	0	6.352	8	0
8 " iron howzr.	937	8	0	3478	2	0	8	7.500	0	0	27.825	0	0
24 pdr. brass "	639	0	0	68	0	0	8	5.112	0	0	544	0	0
Total...	33,339	0	0	5,117	6	0		346,187	0	0	57,949	0	0

TRAIN No. 3.

18 Pdr. iron gun...	10.200	0	0	137	8	0	10	102.000	0	0	1375	0	0
8 inch " mortar.	937	8	0	886	14	0	6	5625	0	0	5321	4	0
5½ " brass "	225	0	0	288	12	0	6	1350	0	0	1732	8	0
8 " iron howzr.	937	8	0	3478	2	0	4	3750	0	0	13.912	8	0
24 pdr. brass "	639	0	0	68	0	0	4	2556	0	0	272	0	0
Total...	12.939	0	0	4859	4	0		115.281	0	0	22,613	4	0

Powder is to be packed in barrels to contain either 100 or 50 lbs each. The former size is the best when the carriage available will admit of their easy transport.

ROUND SHOT.

Are allowed at the rate of one thousand per iron gun, and are carried on hackeries or carriage cattle, according to the resources of the country. They are used without either bottoms or collars.

SHRAPNELL SHELLS.

Table shewing the number of leaden musket balls, required to fill the number of shrapnells allotted to each piece of ordnance with a train, and the total required for the whole train.

Number of musket balls required for one piece of ordnance of each nature				Number of musket balls required for the Train.					
Nature of Ordnance.	No. of Rounds per piece.	Number of Musket balls each shell.	No. of balls required for the total No. of Rounds allotted to a piece.	Number of pieces of ordnance of each nature.	Train No. 1.	No. of pieces of ordnance of each nature.	Train No. 2.	No. of pieces of ordnance of each nature.	Train No. 3.
8 inch iron howzr.	200	380	76.000	12	912.000	8	608.000	4	304.000
24 pdr. Iron gun.	100	125	12.500	24	300.000	10	125.000	0	0
18 " " "	100	90	9.000	12	108.000	10	90.000	10	90.000
12 " " "	100	60	6.000	12	72.000	10	60.000	0	0
24 " brass howzr.	96	125	12.000	12	144.000	8	96.000	4	48.000
Total...			115.500		1.536.000		979.000		442.000

Shrapnell shells are carried packed in boxes, either on carriage cattle or hackeries. They are loaded with the proper proportion of leaden balls and plugged, but the bursting powder is not filled in till required. They are used with tin collars, or when large, with rope grummets.

The tin collars are fixed to the shells with a composition prepared as follows,

Resin, Europe | equal proportions.
Glue, Country. |

Boxes of the following dimensions will contain the number of rounds specified, but boxes of any convenient size according to the carriage procurable may be used.

Nature.	Dimensions.			No. of Rounds in each box.	Weight empty.	Weight filled.	Remarks.
	Length.	Breadth.	Depth.				
	Ins.	Ins.	Ins.	No.	lbs	lbs.	
8 Inch shrapnel	17	17	9	4	32	272	
24 pdr. ,,	18½	12	7	6	31	146	The weight will vary a little according to the wood used.
18 ,, ,,	17	18	6½	6	20	109	
12 ,, ,,	24	95	6	10	21	116	

COMMON SHELLS.

Are carried in the same way as round shot, the 8 inch howitzer shells are to be attached to rope grummets in the park when required for use.

TABLE. No. 1.

Shews the dimensions of canvas bags, log line, twine &c. and shot, required for each nature of grape for mortars and howitzers..

Nature.	Canvas Bags.												Log line.		Shot.			Weight.		
	Breadth cut out.		Length cut out.		Breadth sewed.		twine country to make 100 of each.		Weight of bag finished.		Canvas to make 100.		Length.	Weight.	In a round.	Nominal weight of each		Average total weight of each round.		
	Ft.	In.	Ft.	In.	Ft.	In.	lbs.	oz.	oz.	drs.	Ft.	In.	Ft.	oz.	No.	lbs.	oz.	lbs.	oz.	drs.
10 inch mr.	2	7	1	6	1	2	6	4	14	0	250	0	3	5	100	1	0	100	14	5
8 ,, ,,	2	1	1	3	0	9	3	14½	8	3	162	6	3	5	50	1	0	50	8	8
8 ,, howzr.	2	1	1	3	0	9	3	14½	8	3	162	6	3	5	50	1	0	50	8	8

No. 2 CANVAS.

Nature.		No. of rounds.	Canvas for each nature.		Total for each Train.		
			Feet.	In.	yards.	feet.	In.
Train No. 1	10 Inch Mortar....	300	750	0	1387	1	6
	8 ,, ,,	1.500	2437	6			
	8 ,, Howitzer.	600	975	0			
Train No. 2	8 ,, Mortar....	1.100	1787	6	812	1	6
	8 ,, Howitzer.	400	650	0			
Train No. 3	8 ,, Mortar....	300	487	6	270	2	6
	8 ,, Howitzer.	200	325	0			

No. 3 TWINE FOR CANVAS BAGS.

TRAIN No. 1.							TRAIN No. 2.							TRAIN No. 3.						
Nature and number of rounds.	Weight of twine for 100.			Total weight.			Nature and number of rounds.	Weight of twine for 100.			Total weight.			Nature and number of rounds.	Weight of twine for 100.			Total weight.		
	lbs.	oz.	drs.	lbs.	oz.	drs.		lbs.	oz.	drs.	lbs.	oz.	drs.		lbs.	oz.	drs.	lbs.	oz.	drs.
10 in Mortar 300	6	4	0	18	12	0														
8 „ „ 1500	3	14	8	58	9	8	8 in Mortar 1100	3	14	8	42	15	8	8 in Mortar 300	3	14	8	11	11	8
8 „ Howzr. 600	3	14	8	27	7	0	8 „ Howzr. 400	3	14	8	15	10	0	8 „ Howitzer 200	3	14	8	7	13	0

No. 4—LOG LINE, Europe.

Nature.		No. of Rounds.	For one Round of each.	For each Piece of Ordnance.	No. of Skeins 70 yards for the whole Train.	Weight.		
			Feet	Feet	Skeins	lbs.	oz.	drs.
Train No. 1.	10 Inch Mortar.	300	3	900	34$\frac{2}{7}$	47	14	0
	8 „ „	1500	3	4500				
	8 „ Howitzer.	600	3	1800				
Train No. 2.	8 „ Mortar.	1100	3	3300	21$\frac{3}{7}$	29	4	12
	8 „ Howitzer.	400	3	1200				
Train No. 3.	8 „ Mortar.	300	3	900	7$\frac{1}{7}$	9	12	4
	8 „ Howitzer.	200	3	600				

No. 5.—SHOT IRON for MORTARS AND HOWITZERS.

Nature.	Train No. 1.		Train No. 2.		Train No. 3.	
	Number of shot.	Weight in lbs.	Number of shot.	Weight in lbs.	Number of shot.	Weight in lbs.
1 lb. shot	135,000	135,000	75,000	75,000	25,000	25,000

No. 6.—SHOT IRON for CANISTER CASE.

No. 1 Train.	Shot.			No. 2 Train	Shot.			No. 3 Train	Shot.		
Nature and No. of Rounds.	Nominal weight of shot used.	No. in one Round.	No. in Train.	Nature and No. of Rounds.	Nominal weight of shot used.	No. in one round.	No. in Train.	Nature and No. of Rounds.	Nominal weight of shot used.	No. in one Round.	No. in Train.
24 Pounder Iron Gun.... 2400	8 oz.	46	110400	24 Pdr. 1000	8 oz.	46	46000	„	„	...	„
18 „ „ „ 1200	8 „	39	46800	18 „ „	8 „	39	39000	18 Pdr. 1000	8 oz.	39	39000
12 „ „ „ 1200	3	60	72000	12 „ „	3 „	60	60000	„	„	.	„

TABLE

Shewing the weight of each round of Canister case.

Nature.	Shot. Nominal weight of one round.			Case. Average weight of one case empty.			Bottom. Average weight of one.			Total weight of one round of filled case.		
	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.
24 Pounder Iron Gun	23	,,	,,	1	,,	,,	2	,,	,,	26	,,	,,
18 ,, ,, ,,	19	8	,,	,,	15	,,	1	10	,,	22	1	,,
12 ,, ,, ,,	11	4	,,	,,	10	,,	1	3	,,	13	1	,,

CARCASSES. TABLE No. 1.

Shewing the number of Carcasses of each nature for each Train.

Nature of Carcasses.	Train No. 1.	Total of each Nature.
10 Inch	6,10 Inch Mortars at 10 Carcasses each.	60
8 Inch	12, 8 ,, Howitzers at 10 ....,, ... ,,...120 30, 8 ,, Mortars at 10 ....,, ...,,...300	420
5½ Inch	36, 5½ ,, ,, at 10 ....,, ...,,...360 12,24 Pr. Brass Howrs. at 10......,, ...,,...120	480
	Train No. 2.	
8 Inch	8, 8 Inch Howitzers at 10 Carcasses each...80 22, 8 ,, Mortars at 10....,, ...,,...220	300
5½ Inch	22, 5½ ,, ,, at 10....,, ...,,...220 8,24 Pr. Brass Howrs. at 10 .. ,, ...,,.... 80	300
	Train No. 3.	
8 Inch	4,8 Inch Howitzers at 10 Carcasses each...40 6,8 ,, Mortars at 10 ....,, ...,,.... 60	100
5½ Inch	6,5½ ,, ,, at 10 .... ,, ...,,.... 60 4,24 Pr. Brass Howrs. at 10 .. ,, ...,,.... 40	100

TABLE No. 2.

Shews *the proportion of Ingredients, for Filling, Priming, and Capping* 100 *of each nature of Carcasses required for Siege Trains.*

For filling 100 of each.										For priming 100 of each.										For capping 100 of each.									
Ingredients.	10 Inch.			8 Inch			5 Inch.			Ingredients.	10 Inch.			8 Inch.			5½ Inch.			Ingredients.	10 Inch			8 Inch.			5½ Inch.		
	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.		lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz	drs.		lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.
Antimony..	34	0	0	14	0	0	6	0	0	Saltpetre pulv.	39	10	8	26	7	0	13	3	8	Resin........	4	8	0	3	6	0	2	4	0
Pitch Europe....	68	0	0	28	0	0	12	0	0	Sulphur refd ..	16	9	8	11	1	0	5	8	8	Pitch	3	0	0	2	4	0	1	8	0
Resin	85	0	0	35	0	0	15	0	0	Mealed powder	19	4	4	12	13	0	6	6	12	Bees wax.....	3	0	0	2	4	0	1	8	0
Saltpetre pulvd.	340	0	0	140	0	0	60	0	0	Spr. of wine qr.	1.	$1\frac{12}{16}$	pt	1	qt	0	0	$1\frac{14}{16}$	pt	Tallow........	0	8	0	0	6	0	0	4	0
Sulphur.......	170	0	0	70	0	0	30	0	0	Quick match..	3	14	8	1	9	0	1	2	12	Clothdoosotyyd	14	0	0	8	1	0	4	2	0
Tallow........	34	0	0	14	0	0	6	0	0											PaperEurope Portfire sheets	16	0	0	16	0	0	8	0	0
Corned powder	34	0	0	14	0	0	6	0	0																				

BAGS SERGE CARTRIDGE EMPTY.

	Dimensions.		Quantity of serge 1 yard wide to make 100 bags.		Quantity of silk for sewing 100 bags.		Weight of 100 bags,		Quantity of twine for tying 100 bags.	
	Length.	Breadth.								
	Ins.	Ins.	yds.	feet.	oz.	drs.	lbs.	oz.	oz.	drs.
FIXED AMMUNITION.										
24 pdr. gun, charge ⅓ weight shot	22	18½	37	0	3	0	16	4	10	0
18 ” ” ” ” ”	20½	16½	30	0	2	9	13	12	8	10
12 ” ” ” ” ”	17½	14½	21	0	2	8	9	7½	6	0
UNFIXED AMMUNITION.										
24 pdr. gun, charge ⅓ shots weight.	16	8½	28	0	2	2	11	7	4	2
18 ” ” ” ”	15	16½	25	0	1	14	9	8	3	12
12 ” ” ” ”	13	14½	21	0	2	0	8	8¼	2	0
10 Inch mortar charge ...... 2 lbs.	10	7½	14	0	1	9	6	3	3	14
8 ” ” ” ....1¼ ”	8	17½	11	1	1	7	4	11	3	4
5½ ” ” ” .... ¾ ”	7½	13	8	1½	1	4	3	14	3	4
8 ” Howitzer ” .... 4 ”	13	25	23	0	2	6	10	14	5	8
24 Pdr. ” ” .... 2 ”	9½	18	12	1½	1	0	7	1½	1	8

TRAIN No. 1.

	Number and Description of Bags.		Number of bags for each nature.	Proportion of serge to make 100 bags.	No. of pieces of serge of 63 yds. long and 1 wide to make the number of bags.		No. of pieces and weight of serge for the whole train each piece of serge weighing 32 pounds.
			No.	yds.	piece	yds.	
Fixed.	24, 24 pdrs. at 1000 rds. each and ⅛ spare............. ½ more for recovered shot.	27000 13500	40,500	37	237	54	554 Pieces and 25 yards, Weight 17741 lbs.
Unfixed	24, 24 pdrs at 200 rds. each & ⅛ spare for shrapnell shells& Grape........................ ..	....	5.400	28	24	0	
Fixed.	12, 18 pdrs. at 1000 rds each and ⅛ spare .... ½ more for recovered shot.	13500 6750	20.250	30	96	27	
Unfixed	12, 18 pdrs. 200 rds. each & ⅛ spare for shrapnell shells and grape	....	2.700	25	10	45	
Fixed.	12, 12 pdrs. at 1000 rds. each and ⅛ spare....................... ½ more for recovered shot.	13500 6750	20.250	21	67	32	
Unfixed	12, 12 pdrs at 200 rds. each & ⅛ spare for shrapnell shells & grape.................	....	2700	21	9	0	
	6, 10 inch mortars 560 rds. each and ⅛ spare		3780	14	8	26	
	30, 8 „ „ 560 „ „ „ „		18.900	11⅓	4	0	
	36, 5½ „ „ 360 „ „ „ „		14.580	8½	39	43	
	12, 8 „ howzr. 810 „ „ „ „		10.935	23	19	59	
	12, 24pdr. brass „ at 256 „ „ „ „		3456	12½	36	54	

TRAIN NO. 2.

	NUMBER AND DESCRIPTION OF BAGS.	No. of bags for each nature.	Proportion of serge to make 100 bags.	No. of pieces of serge of 63 yds. long and 1 wide to make the No. of bags.		No. of pieces and weight of serge for the whole train each piece of serge weighing 32 lbs.
		No.	yds.	piece	yds.	
Fixed	10, 24 Pdr. at 1000 rds. each and ⅛ spare .... 11.250 ½ more for recovered shot 5.625	16.875	37	99	7	330 Pieces and 22 yards, Weight 10571 lbs.
Unfixed	10, 24 Pdr. at 200 rds. each and ⅛ spare for Shrapnell shells and grape	2.250	28	10	0	
Fixed	10, 18 Pdr. at 1000 rds. each and ⅛ spare................ 11.250 ½ more for recovered shot 5.65.2	16.875	30	80	23	
Unfixed	10, 18 Pdr. at 200 rds. each and ⅛ spare for Shrapnell shells and grape.	2.250	25	8	59	
Fixed	10, 12 Pdr. at 1000 rds. each and ⅛ spare.................... 11.250 ½ more for recovered shot... 5.625.	16.875	21	56	16	
Unfixed	10, 12 Pdr. at 200 rds. each and ⅛ spare for Shrapnell shells and grape.	2.250	21	7	32	
	22, 8in. mortars at 560 rds. each & ⅛ spare	13.860	11⅓	24	59	
	22. 5½ „ „ 360 „ „ „	8.910	8½	12	2	
	8, 8in. Howitz. 810 „ „ „	7.290	23	26	39	
	8, 24 Pdr. brass„256 „ „ „	2.304	12½	4	37	

TRAIN NO. 3.

Fixed	10, 18 Pdr. at 1000 rds, each and ⅛ spare................ 11.250 ½ more for recovered shot 5.625.	16.875	30	80	23	115 pieces weight 3680 lbs.
Unfixed	10, 18 Pdr. at 200 rds. each and ⅛ spare for Shrapnell shells and grape.	2.240	25	8	59	
	6, 8in mortars at 560 rds. each & ⅛ spare	3780	11⅓	6,51		
	6, 5½in. „ „ 360 „ „ „	2430	8½	3	18	
	4, 8in. Howitz. 810 „ „ „	3645	23	13	20	
	4, 24 Pdr. brass„ 256 „ „ „	1152	12½	2	18	

Silk for Cartridge Bags.

TRAIN No. 1.

	No. of Bags for each nature of Ordnance.	Quantity of Silk required					
		For 100 Bags.		For each nature of Ordnance.		For the whole Train.	
		oz.	drs	lbs.	oz.	lbs.	oz
For 24 pdrs. Fixed Ammunition	40.500	3	0	75	15	0	0
„ „ „ Unfixed „	5.400	2	2	7	2¾	0	0
„ 18 „ Fixed „	20.250	2	9	32	7	0	0
„ „ „ Unfixed „	2.700	1	14	3	2¾	0	0
„ 12 „ Fixed „	20.250	2	8	31	11	0	0
„ „ „ Unfixed „	2.700	2	0	3	6	204	4¾
„ 10 Inch Mortars „	3.780	1	9	3	11	0	0
„ 8 „ „ „	18.900	1	7	16	15¾	0	0
„ 5½ „ „ „	14.580	1	4	11	7¼	0	0
„ 8 „ Howitzers „	10.935	2	6	16	3¾	0	0
„ 24 Pdr. Brass „ „	3.456	1	0	2	2½	0	0

TRAIN No. 2.

For 24 prs. Fixed Ammunition.........	16.875	3	0	31	10¼	0	0
„ „ „ Unfixed „	2.250	2	2	2	15¾	0	0
„ 18 „ Fixed „	16.875	2	9	27	½	0	0
„ „ „ Unfixed „	2.250	1	14	2	10¼	0	0
„ 12 „ Fixed „	16.875	2	8	26	5	125	1¼
„ „ „ Unfixed „	2.250	2	0	2	13	0	0
„ 8 inch Mortars „	13.860	1	7	12	7¼	0	0
„ 5½ „ „ „	8.910	1	4	6	15½	0	0
„ 8 „ Howitzers „	7.290	2	6	10	13	0	0
„ 24 pdrs. Brass „ „	2.304	1	0	1	7	0	0

TRAIN No. 3.

For 18 pdr. Fixed Ammunition.	16.875	2	9	27	½	0	0
„ „ „ Unfixed „	2.250	1	14	2	10¼	0	0
„ 8 inch Mortars „	3.780	1	7	3	6¼	41	13¼
„ 5½ „ „ „	2.430	1	4	1	14½	0	0
„ 8 „ Howitzer „	3.645	2	6	5	6¾	0	0
„ 24 pdr, Brass „ „	1.152	1	0	0	11½	0	0

Twine for Tying Cartridge Bags.

TRAIN No. 1.

	Number of Bags for each Nature of Ordnance.	Quantity of twine required.					
		For tying 100 bags.		For each nature of ordnance.		For the whole train.	
		oz.	drs.	lbs.	oz.	lbs.	oz.
For 24 pdr. Fixed Ammunition.	40.500	10	0	253	2	0	0
,, ,, ,, Unfixed ,,	5.400	4	2	13	14¾	0	0
,, 18 ,, Fixed ,,	20.250	8	10	109	2½	0	0
,, ,, ,, Unfixed ,,	2.700	3	12	6	5¼	0	0
,, 12 ,, Fixed ,,	20.250	6	0	75	15	0	0
,, ,, ,, Unfixed ,,	2.700	2	0	3	6	587	3¾
,, 10 Inch Mortars ,,	3.780	3	14	9	2½	0	0
,, 8 ,, ,, ,,	18.900	3	14	45	12½	0	0
,, 5½ ,, ,, ,,	14.580	3	4	29	9¾	0	0
,, 8 ,, Howitzers ,,	10.935	5	8	37	9½	0	0
,, 24 Pdr. Brass ,, ,,	3.456	1	8	3	4	0	0

TRAIN No. 2.

For 24 pdr. Fixed Ammunition.	16.875	10	0	105	7	0	0
,, ,, ,, Unfixed ,,	2.250	4	2	5	12¾	0	0
,, 18 ,, Fixed ,,	16.875	8	10	90	15½	0	0
,, ,, ,, Unfixed ,,	2.250	3	12	5	4½	0	0
,, 12 ,, Fixed ,,	16.875	6	0	63	4½	352	7¼
,, ,, ,, Unfixed ,,	2.250	2	0	2	13	0	0
,, 8 Inch Mortars ,,	13.860	3	14	33	9	0	0
,, 5½ ,, ,, ,,	8.910	3	4	18	1½	0	0
,, 8 ,, Howitzers ,,	7.290	5	8	25	1	0	0
,, 24 pdr. Brass ,, ,,	2 304	1	8	2	2½	0	0

TRAIN No. 3.

For 18 pdr. Fixed Ammunition.	16.875	8	10	90	15½	0	0
,, ,, ,, Unfixed ,,	2.250	3	12	5	4½	0	0
,, 8 Inch Mortars ,,	3.780	3	14	9	2½	123	15¼
,, 5½ ,, ,, ,,	2.430	3	4	4	15	0	0
,, 8 ,, Howitzers ,,	3.645	5	8	12	8½	0	0
,, 24 pdr. Brass ,, ,,	1.152	1	8	1	1¼	0	0

BOXES PACKING

for Shrapnell Shells, Light Balls, Rockets and Fuzes.

NATURE.	Dimensions.			Number of rounds.	Weight, empty.	Weight, filled.	REMARKS.
	Length.	Breadth.	Depth.				
	Ins.	Ins	Ins.	No.	lbs.	lbs.	
8 Inch Shrapnell Shells.........	17	17	9	4	32	272	The weight will of course vary a little according to the wood used.
24 Pdr. or 5½ Inch...........	18½	12	7	6	31	146	
18 „	17	11	6½	6	20	109	
12 „	20	14½	6	12	23	137	
5½ Inch Light Balls	31	12	6¼	10	40	98	
Signal Rockets.......................	27	16½	9¼	50	29	88	
FUZE BOXES.							
10 Inch common..............	30	15	11	200	48	132	
8 „ „	26	15	11	200	43	97	
5½ „ „	26	15	11	400	43	95	
1st Size Shrapnell..................	22½	16	9	720	37	96	
2d „ „	17	12½	7	720	20	62	

The following Tables shew the proportion of each description of Packing Boxes, required for each Train.

For Shrapnell Shells.

	Train No. 1.	No. of rounds of each nature.	No. of rounds carried in each box.	No. of boxes required for each nature.	Total weight of boxes filled for each nature of Shell.
					lbs.
8 In.	12,8 In. How. at 200rds. each 2400	3900	4	975	265200
	30,8 „ Mor. at 50 „ „ 1500				
5½ In. or 24 Pdr.	24,24 Pdr. Guns 100 „ „ 2400	5352	6	892	130232
	12,24 Brass How. 96 „ „ 1152				
	36,5½ In Mortars. 50 „ „ 1800				
18 Pdr.	12,18 Pdr. Guns 100 „ „	1200	6	200	21800
12 Pdr.	12,12 „ „ 100 „ „	1200	12	100	13700
		Total weight			430932

TRAIN No. 2.

8 In.	8,8 In. How. at 200 rds each 1600	2700	4	675	183.600
	22,8 „ Mor. „ 50 „ „ 1100				
5½ In or 24 Pdr.	10,24 Pdr. Guns 100 „ „ 1000	2868	6	478	49.788
	8,24 Brass How. 96 „ „ 768				
	22,5½ In Mortrs. 50 „ „ 1100				
18 Pdr.	10,18 Pdr. Guns 100 „ „	1000	6	167	18.203
12 „	10,12 „ „ 100 „ „	1000	12	84	11.508
		Total weight		....	263.099

TRAIN No. 3.

8 In.	4,8 In. How. at 200 rds. each 800	1100	4	275	74800
	6,8 „ Mor. „ 50 „ „ 300				
5½ In or 24 Pdr.	4,24 Pr. Br. Hr. 96 „ „ 384	684	6	114	16644
	6,5½ In. Mor. 50 „ „ 300				
18 Pdr.	10,18 Pdr. Guns 100 „ „	1000	6	167	18203
		Total weight			109647

For Light Balls.

	No. of rounds for each Train.	No. of rounds carried in each box.	No. of boxes required for each Train	Weight of boxes filled for each Train at 98lbs. each.
				lbs.
Train No. 1. 36,5½ Inch Mortars at 10 rounds each..........	360	10	36	3528
Train No. 2. 22,5½ Inch Mortars at 10 rounds each..........	220	10	22	2178
Train No. 3. 6,5½ Inch Mortars at 10 rounds each..........	60	10	6	588

For Shrapnell Fuzes.

TRAIN No. 1.		Number of Fuzes for each nature.	Number of Fuzes for the whole Train.	Number of fuzes carried in each box.	No of boxes required for each nature of Ord	Weight of one box filled. lbs.	Total weight boxes filled for each nature. lbs.
1st size	12,8in. How. at 200 fuzes each & ⅕ spare	2880	4680	720	7	96	672
	30, 8in. Mortr. at 50 fuzes each & ⅕ spare	1800					
2d size	24,24 pdr. at 100 fuzes each & ⅕ spare	2880	16.560	720	23	62	1426
	12,18 do.	1440					
	12,12 do.	1440					
	36,5½in. Mortr. at 50 rds. each & ⅕ spare	2160					
	12,24 pdr. brass How. at 4 fuzes for each round of common & shrapnell shells.	8640					

TRAIN No. 2.

1st size	8,8in, Howz at 200 fuzes each & ⅕ spare	1920	3240	720	5	96	480
	22,8in. Mortr. at 50 fuzes each & ⅕ spare	1320					
2d size	10,24 pdr. at 100 fuzes each & ⅕ spare	1200	10.680	720	15	62	930
	10,18 do.	1200					
	10,12 do.	1200					
	22,5½in Mortr at 50 fuzes each & ⅕ spare	1320					
	8,24 pdr. brass How. at 4 fuzes for each round of common & shrapnell shells.	5760					

TRAIN No. 3.

1st size	4, 8in. How. at 200 fuzes each & ⅕ spare	960	1320	720	2	96	192
	6, 8in. Mortars at 50 fuzes each & ⅕ spare	360					
2d size	10,18 Pdrs. at 100	1200	4440	720	7	62	434
	6,5½in. Mortars at 50 fuzes each & ⅕ spare	360					
	4,24 pdr. brass How. at 4 fuzes for each round of common & shrapnell shells.	2880					

For Common Fuzes.

Train No. 1.	Number of Fuzes for each nature.	Number of Fuzes for the whole Train.	Number of fuzes carried in each box.	No. of boxes required for each nature of Ord	Weight of one Box filled.	Total weight of box filled for each nature.
					lbs.	lbs.
10 In. 6, 10 in. mortars at 500 fuzes each & $\frac{1}{5}$ spare.	3600	3600	200	18	132	2.376
8 In. 12, 8in. Howz. at 500	7200	25,200	200	126	97	12.222
30, 8in. Mortr at 500	18.000					
5½in. or 24Pdr. 36, 5½in at 300 „	12.969	14.170	400	36	95	3420
12,24 pdr. brass H. 84	12 10					

TRAIN No. 2.

8 In. 8. 8in. Howzr. at 500	4800	18.000	200	90	97	8730
22,8in. Mort. at 500	13.200					
fuzes each & $\frac{1}{5}$ spare						
5½ In. or 24 Pdr. 22,5½in. Mort. at 300	7920	8727	400	22	95	2090
8,24 pdr. brass H. 84	807					
fuzes each & $\frac{1}{5}$ spare						

TRAIN No. 3.

8 In. 4,8in. Howitz. at 500	2400	6000	200	30	97	2910
6,8in. Mortrs. at 500	3600					
fuzes each & $\frac{1}{5}$ spare						
5½ In. or 24Pdr. 6,5½in. Mortr. at 300	2160	2564	400	7	95	665
4,24 pdr. brass H. at 84	404					
fuzes each & $\frac{1}{5}$ spare						

FUZE COMPOSITION.—Table No. 1.

Shews the proportion of composition required to fill 100 *of each description of Fuzes.*

Nature of Fuzes.	Proportion of Ingredients for composition for 100 Fuzes.									Total quantity of composition required for 100 Fuzes.		
	Saltpetre 15 parts.			Sulphur 9 parts.			Mealed Powder 17½ parts.					
	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.
Common. 10 Inch Fuzes	2	9	11	1	9	0	3	0	10	7	3	5
Common. 8 „ „	2	3	8	1	5	5	2	9	6	6	2	3
Common. 5½ „ „	1	6	1	0	13	4	1	9	12	3	13	1
1st and 2d size Shrapnell	0	9	8	0	5	12	0	11	2	1	10	6

N. B.—These are the proportions used in Bengal to burn 5 seconds to an Inch for all Fuzes. The Board recommend this rate of burning to be generally adopted.

TABLE No. 2.

Shews the quantity of Composition required for the Fuzes of each Train.

Train No. 1.	No. of Fuzes for each nature of Ordnance.	No. of each nature of Fuzes for the whole Train.	Proportion of ingredients for composition for the number of Fuzes of each nature. Saltpetre 15 parts. lbs.	oz.	drs.	Sulphur 9 parts. lbs.	oz.	drs.	Mealed Powder 17½ parts. lbs.	oz.	drs.	Total quantity of compositionrequired for the No. of Fuzes of ea. nature. lbs.	oz.	drs.	Total of composition for each Train.
Common Fuzes.															
10 Inch 6,10in. Mor. at 500 Fuzes each and $\frac{1}{5}$ spare.	3600	3600	93	11	10	56	3	12	109	5	9	259	5	0	lbs. 2 6 9 3—7—12
8 In. 12,8 „ How. „ 500 „ „ „ „	7200	25,200	558	9	10	335	2	9	651	11	4	1545	7	8	
30,8 „ Mor. „ 500 „ „ „ „	18000														
5½ „ 36,5½ „ „ „ 300 „ „ „ „	12960	14,170	195	4	4	117	2	8	227	12	14	540	3	11	
12,24 „ P. B. H. 84 „ „ „ „	1210														
Shrapnell Fuzes.															
1st size 12,8in. How. at 200 Fuzes each and $\frac{1}{5}$ spare.	2880	4680	27	12	0	16	10	7	32	6	1	76	12	8	
30,8 „ Mor. „ 50 „ „ „ „	1800														
2d size 24,24 Pdr, „ 100 „ „ „ „	2880	16,560	98	3	4	58	14	12	114	9	2	271	11	0	
12,18 „ „ 100 „ „ „ „	1440														
12,12 „ „ 100 „ „ „ „	1440														
36,5½in. Mor „ 50 „ „ „ „	2160														
12,24 Pdr. Brass How. at 4 Fuzes for each round of Common and Shrapnell Shells	8640														
			973	8	12	584	2	0	1135	12	14	2693	7	11	

TRAIN No. 2.

	Common Fuzes.															
In.	8,8 In. How. at 500 Fuzes each and $\frac{1}{5}$ spare.	4800	18.000	399	0	0	239	6	6	465	8	1	1103	14	8	lbs. 1665—0—0
	22,8 „ Mor. „ 500 „ „ „ „	13200														
5½ „	22,5½ „ „ „ 300 „ „ „ „	7920	8.727	120	4	2	72	2	8	140	4	13	332	11	7	
	8,24 Pr. B.H. „ 84 „ „ „ „	807														
	Shrapnell Fuzes.															
1st size	8,8 In. How. at 200 Fuzes each and $\frac{1}{5}$ spare.	1920	3.240	19	3	7	11	8	7	22	6	10	53	2	8	
	22,8 „ Mor. „ 50 „ „ „ „	1320														
2d size	10,24 Pdr. „ 100 „ „ „ „	1200	10.680	63	5	5	38	0	0	73	14	3	175	3	8	
	10,18 „ „ 100 „ „ „ „	1200														
	10,12 „ „ 100 „ „ „ „	1200														
	22,5½ In. M. „ 50 „ „ „ „	1320														
	8,24 Pdr Brass How. at 4 Fuzes for each round of Common and Shrapnell Shells	5760														
				601	12	14	361	1	5	702	1	11	1664	15	15	

TRAIN No. 3.

	Common Fuzes.															
8 In.	4,8 In. How. at 500 Fuzes each and $\frac{1}{5}$ spare.	2400	6.000	133	0	0	79	12	12	155	2	10	367	15	8	lbs. 560—3—8
	6,8 „ Mor. „ 500 „ „ „ „	3600														
5½ in.	6,5½ „ „ „ 300 „ „ „ „	2160	2.564	35	5	4	21	3	3	41	3	8	97	12	0	
	4,24 Pr. B.H. „ 84 „ „ „ „	404														
	Shrapnell Fuzes.															
1st size	4,8 In. How. at 200 Fuzes each and $\frac{1}{5}$ spare.	960	1.320	7	13	4	4	11	3	9	2	2	21	10	8	
	6,8 „ Mor. „ 50 „ „ „ „	360														
2d size	10,18 Pdr. „ 100 „ „ „ „	1200	4.440	26	5	4	15	12	12	30	11	8	72	13	8	
	6,5½ Mor. „ 50 „ „ „ „	360														
	4,24 Pdr. Brass How. at 4 Fuzes for each round of Common and Shrapnell Shells	2880														
				202	8	0	121	7	14	236	3	12	560	3	8	

FUZES COMMON.

TRAIN No. 1.	No. and weight of Fuzes.			
	No. for each nature of Ord.	No. of each nature of fuzes for the whole Train.	Weight of each nature.	Total weight.
	No.	No.	lbs.	lbs.
10 in.—6,10in. M. at 500 fuzes each & 1/5 spare	3600	3600	1519	10138
8 in. 12,8in. H.,, 500 ,, ,, ,, ,, ,,	7200	25.200	6792	
30,8 ,, M. ,, 500 ,, ,, ,, ,, ,,	18000			
5½in. or 24 Pdr. 36,5½ ,, ,, ,, 300 ,, ,, ,, ,, ,,	12960	14.170	1827	
12,24 pdr. B.H. 84 ,, ,, ,, ,, ,,	1210			

TRAIN No. 2.

8 inch 8,8in. H. at 500 fuzes each & 1/5 spare	4800	18.000	4852	5977
22,8 ,, M. ,, 500 ,, ,, ,, ,, ,,	13200			
5½in. or 24 Pdr. 22,5½ ,, ,, 300 ,, ,, ,, ,, ,,	7920	8727	1125	
8,24 pdr. H.,, 84 ,, ,, ,, ,, ,,	807			

TRAIN No. 3.

8 inch 4,8in. H. at 500 fuzes each & 1/5 spare	2400	6000	1617	1948
6,8in. M. ,, 500 ,, ,, ,, ,, ,,	3600			
5½in. or 24 Pdr. 6,5½ ,, ,, 300 ,, ,, ,, ,, ,,	2160	2564	331	
4,24 pdr. B.H. ,, 84 ,, ,, ,, ,, ,,	404			

FUZES SHRAPNELL.

TRAIN No. 1.	No. and weight of Fuzes.			
	Number of each nature.	Number for the whole Train.	Weight of each nature.	Total weight.
	No.	No	lbs.	lbs.
1st size 12,8in. Hr. at 200 fuzes ea. & 1/5 spare	2880	4680	384	1354
30,8in. Mortr. ,, 50 fuzes ,, ,, ,, ,,	1800			
2d size 24,24 Pdr. at 100 ,, ,, ,, ,, ,,	2880	16.560	970	
12,18 ,, ,, 100 ,, ,, ,, ,, ,,	1440			
12,12 ,, ,, 100 ,, ,, ,, ,, ,,	1440			
36,5½in Mor. ,, 50 ,, ,, ,, ,, ,,	2160			
12,24 Pdr. brass Howtz. at 4 fuzes to eh. rnd. of common & shrapnell shells	8640			

TRAIN No. 2.

1st size	8,8in. H. at 200 fuzes each & $\frac{1}{5}$ spare	1920	3240	266	892
	22,8in M. at 50 „ „ „ „ „	1320			
2d size	10,24 pdr. „100 „ „ „ „ „	1200	10.680	626	
	10,18 „ „ 100 „ „ „ „ „	1200			
	10,12 „ „ 100 „ „ „ „ „	1200			
	22,5½in. M.„ 50 „ „ „ „ „	1320			
	8,24 Pdr. brass Howitzer at 4 fuzes ea. rd. of common & shrapnell shells	5760			

TRAIN No. 3.

1st size	4,8in. H. at 200 fuzes each & $\frac{1}{5}$ spare	960	1320	108	368
	6,8 „ M. „ 50 „ „ „ „ „	360			
2d size	10,18 pdr. „ 100 „ „ „ „ „	1200	4440	260	
	6,5½in. M. „ 50 „ „ „ „ „	360			
	4,24 Pdr. brass How. at 4 fuzes each rnd. of common or shrapnell shells.	2880			

INSTRUMENTS, GUNNERS.

Table No. 1.—*Shews the number of Setts of Instruments large and small allowed to each Train.*

		No. of Sets.
LARGE SETS.		
Train No. 1		8
Train No. 2		4
Train No. 3		2
SMALL SETS.		
Train No. 1.		
48 Guns at 1 Set to every 4	12	35
6,10 Inch Mortars at 1 Set to every 2	3	
30,8 „ „ 36,5½ „ „ and 12,8 „ Howitzers. 1 Set to every 4	20	
Train No. 2.		
30 Guns at 1 Set to every 4	8	21
22,8 Inch Mortars 22,5½ „ „ and 8,8 „ Howitzers. at 1 Set to every 4	13	
Train No. 3.		
10 Guns at 1 Set to every 4	3	7
6,8 Inch Mortars 6,5½ „ „ and 4,8 „ Howitzers. at 1 Set to every 4	4	

TABLE No. 2

Shews the description and number of Instruments contained in each set

LARGE SET.

2 Augurs, fuze, with Brace.
2 ,, Hand.
1 Bellows pairs for proving shells
1 Calliper gun large pairs.
1 ,, ,, small ,,
1 ,, shell 4 in a set, viz.
3 Callipers bow of sizes and
1 ,, bottom.
1 ,, Compass steel
1 Engine, Fuze, 2 in a set, sets
2 Files, saw ,,
2 Funnels, copper.
2 Graduators Fuze.
1 Guages, shot, Hemispherical sets
1 Hammer, for proving shells.
1 Instruments, mathematical, case of.
1 Level, Spirit.
2 Marker's Fuze.
2 Mallets setting 2 in a set large.
2 ,, ,, 2 ,, ,, small
1 Mirror with case.
1 Measure, powder common 3 in a set—sets.
2 Pincers Fuze.
1 Quadrant.
2 Rasps, Fuze.
2 Saws ,,
1 Scraper Shell.
1 Scale, Gunter's brass.
2 Sets, Saw.
2 Setters Fuze 3 in a set. viz. { 1.10 inch, 1.8 ,, $1.5\frac{1}{2}$,, } sets.
1 Telescope.
1 Vice Block or Bench Fuze.
1 ,, Hand Fuze.
2 ,, Coopers.
4 Drifts, Fuze, sets 4 in a set, $\frac{3}{10}$ diameter.
4 Ladles, composition Fuze.
2 Composition Cups.
20 Strips of Leather.
1 Scales Copper with weights to weigh 4 pounds.
1 do. do. do. to weigh 12 ounces.
1 Measure Sph. case 7 in a set, sets.

SMALL SET.

2 Augers, Fuze, with Brace
2 ,, Hand
1 Compass, Steel
2 Files, Saw
2 Funnels, Copper
1 Level, Spirit
2 Mallets, Fuze, Setting 2 in a Set { Large, Small
2 Markers Fuze
1 Measure for Spherical Case 7 in a set, Sets.
2 Pincers, Fuze
1 Quadrant
2 Rasps, Fuze
2 Saws do.
1 Scale, Gunters, Brass
2 Sets Saw
2 Setters, Fuze 3 in a set viz. { 1.10 Inch, 1.8 do. $1.5\frac{1}{2}$ do. } Sets.
1 Telescope
1 Vice, Block or Bench Fuze
1 do Hand, Fuze
1 Scales, Copper, with weights to weigh 4 Pounds
1 do do. do. to weigh 12 oz.

SALTPETRE.

Proportion required for Fuzes, Signal Rockets, and for Priming Carcases, for each Train.

	Train No.			Train No. 2			Train No. 3		
	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs
For Fuzes - - - - - - - - - -	973	8	12	601	12	14	202	7	13
„ Rockets - - - - - - - - -	5410	8	12	3607	0	8	1803	8	4
„ Priming Carcases 10 Inch	23	12	11	0	0	0	0	0	0
„ „ „ 8 „	111	0	10	79	5	0	26	7	0
„ „ „ 5½ „	63	7	3	39	10	8	13	3	8
Total......	6582	6	0	4327	12	14	2045	10	9

LIGHT BALLS.

Table No. 1.—*Shews the number and description of Light Balls carried with each Train.*

Trains.	Total for each Train.
Train No. 1.36, 5½ Inch Mortars, at 10 Balls each. ...	360
„ 2.22, „ „ 10 „	220
„ 3. 6, „ „ 10 „	60

TABLE No. 2.

Shews the proportion of Materials required for making the number of Light Balls for each Train.

	For making the Light Balls.										For Priming.												Moulds for casting			
	Antimony,		Saltpetre.			Sulphur.		Pitch.			Saltpetre.			Sulphur.			Mealed Powder.		Quick match.		Spts. of wine.		Paper E. Port-fire.	Flour for paste.		
	lbs.	oz.	lbs.	oz.	drs.	lbs.	oz.	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs.	oz.	drs.	lbs,	oz.	lbs.	oz.	qts.	pts.	Sheets	lbs.	oz.	drs.
Train No. 1, 360 Rounds ...	112	8	1499	15	6	562	8	110	1	10	26	1	10	16	3	3	31	8	22	8	1	¾	2160	26	1	10
„ 2, 220 „ ...	68	12	916	10	5	343	12	68	12	0	15	15	3	9	14	6	19	4	13	12	0	1¾	1320	15	15	3
„ 3, 60 „ ..	18	12	249	15	14	93	12	18	5	10	4	5	10	2	11	3	5	4	3	12	0	½	360	4	5	10

The composition for these Light Balls is heated and cast, or rather rammed into paper moulds so as to form a hard and solid mass of the size required when the mould is removed.

(Signed) J. Stevenson, Lieut. Colonel,
J. Tennant, Lieut. Colonel,
C. Graham, Major,
G. Conran, Major,
R. S. Seton, Captain,
W. T. Whitlie, Brevet Captain.

A true Copy.

(Signed) J. Stuart, Lieut. Colonel,
Officiating Secy. to the Govt. of India,
Military Department.

LIST *of Ordnance, Implements, Ammunition and Siege Stores for Trains, as recommended by the Board of Ordnance, composed of Officers from the Bengal, Madras, and Bombay Artillery, assembled at Fort William for the purpose of assimilating the Ordnance Equipment of the three Presidencies.*

TRAIN No, 1.

ORDNANCE AND IMPLEMENTS.	Guns.			Howtz.		Mortars.		
	24 Pdr.	18 „	12 „	8 Inch.	24 Pdr.	10 Inch.	8 „	5½ „
Ordnance, Brass - - -	0	0	0	0	12	0	0	36
„ Iron - - - - -	24	12	12	12	0	6	30	0
Carriages with Limbers - -	24	12	12	12	0	0	0	0
Beds, Iron - - - -	0	0	0	0	0	6	30	0
„ Wooden - -	0	0	0	0	0	0	0	36
Aprons, Canvas gun - -	24	12	12	12	0	0	0	0
Bits, Gimblet. - -	24	12	12	12	0	6	30	36
„ Gun - - -	24	12	12	12	0	6	30	36
Bearers Iron for red hot shot - -	72	36	36	0	0	0	0	0
„ leather for loading 5½ & 8in. shells	0	0	0	3900	0	0	21000	11.808
Boxes, Store . - - - -	24	12	12	12	0	0	0	0
„ Tube (when tubes or quick match are used) - - - - -	24	12	12	12	0	6	30	36
Buckets water gun - - -	24	12	12	12	0	6	30	36
Caps canvas for Spunges - -	48	24	24	24	0	12	60	72
„ „ for How. & Mortar muzzles	0	0	0	12	0	6	30	36
Chains draft pole - - -	24	12	12	12	0	0	0	0
„ „ leading - - -	1 to every pair of leading bullocks							
„ „ locking - -	24	12	12	12	0	0	0	0
Clip bands pole Yoke - -	48	24	24	24	0	0	0	0
Clippers Portfire on Blocks - -	24	12	12	12	0	6	30	26
Coins for Mortars - -	0	0	0	0	0	12	60	36
Drag ropes common - - sets	48	24	24	24	0	0	0	0
Drifts vent - - - -	24	12	12	12	0	6	30	36
Esses Iron - - - - -	144	72	72	72	0	0	0	0
Hammers claw - - -	24	12	12	12	0	0	0	0
„ Wrench - - -	24	12	12	12	0	6	30	36
Handspikes common - -	96	48	48	48	0	0	0	72
„ traversing - -	96	48	48	48	0	0	0	0
„ „ Iron - -	0	0	0	0	0	12	60	0
Hatchets hand - - -	24	12	12	12	0	6	30	36
Kegs for tar and grease - -	24	12	12	12	0	0	0	0
Keys for cap squares - -	144	72	72	72	0	0	0	0
Ladles with wadhooks - -	24	12	12	0	0	0	0	0
Linchpins - - -	144	72	72	72	0	0	0	0
Linstocks with cocks - -	12	6	6	6	0	3	15	8
Pouches priming - -	24	12	12	12	0	0	0	0
Screws elevating - -	24	12	12	12	0	0	0	36
Sights gunners - - -	24	12	12	0	0	0	0	0
Spikes, gun spring double -	48	24	24	24	0	0	0	0
„ „ jagged - -	48	24	24	24	0	12	60	72
Spike relievers - - -	48	24	24	24	0	0	0	0

TRAIN No. I, continued.

ORDNANCE AND IMPLEMENTS.	Guns,			Howtz.		Mortars.		
	24 Pdr.	18 "	12 "	8 Inch.	24 Pdr.	10 Inch.	8 "	5½ "
Spunges with rammer heads ...	48	24	24	24	0	12	60	72
Tompions with collars	24	12	12	if muz. caps not used.				
Washers drag	120	60	60	60	0	0	0	0
Wedges small iron	0	0	0	0	0	12	60	72
Wires priming	48	24	24	24	0	12	60	72
Wrenches common	24	12	12	12	0	0	0	0
Yokes pole or leading	1 to every pair of Bullocks including spare.							

TRAIN No. 2.

Ordnance Brass ...	0	0	0	0	8	0	0	22
" Iron - ...	10	10	10	8	0	0	22	0
Carriages with Limbers - ...	10	10	10	8	8	0	0	0
Beds, Iron - ...	0	0	0	0	0	0	22	0
" Wooden - ...	0	0	0	0	0	0	0	22
Aprons gun canvas ...	10	10	10	8	0	0	0	0
Bits, Gimblet	10	10	10	8	0	0	22	22
Bits, Gun	10	10	10	8	0	0	22	22
Boxes, Store	10	10	10	8	0	0	0	0
" Tube (when Tubes or quick match are used) .. .	10	10	10	8	0	0	22	22
Buckets, water gun	10	10	10	8	0	0	22	22
Bearers Iron, for red hot shot ...	30	30	30	0	0	0	0	0
" leather for loading 5½ and 8 in. shells	0	0	0	2700	0	0	15000	7272
Caps, canvas for Spunges ...	20	20	20	16	0	0	44	44
" " for Howitzer and Mortar muzzles	0	0	0	8	0	0	22	22
Chains, draft pole	10	10	10	8	0	0	0	0
" " leading	1 to every pair of leading bullocks							
" locking	10	10	10	8	0	0	0	0
Clip bands pole yoke	20	20	20	16	0	0	0	0
Clippers portfire on blocks ...	10	10	10	8	0	0	22	22
Coins for Mortars	0	0	0	0	0	0	44	22
Dragropes common .. sets...	20	20	20	16	0	0	0	0
Drifts vent	10	10	10	8	0	0	22	22
Esses, Iron	60	60	60	48	0	0	0	0
Hammers claw	10	10	10	8	0	0	0	0
" wrench	10	10	10	8	0	0	22	22
Handspikes common	40	40	40	32	0	0	0	44
" traversing	40	40	40	32	0	0	0	0
" Iron	0	0	0	0	0	0	44	0

TRAIN No. 2, continued.

ORDNANCE AND IMPLEMENTS.	Guns.			Howtz.		Mortars.		
	24 Pdr.	18 "	12 "	8 Inch.	24 Pdr.	10 Inch.	8 "	5½ "
Hatchets hand	10	10	10	8	0	0	22	22
Keg for tar and grease	10	10	10	8	0	0	0	0
Keys for cap squares	60	60	60	48	0	0	0	0
Ladles with wadhooks	10	10	10	0	0	0	0	0
Linchpins	60	60	60	48	0	0	0	0
Linstocks with cocks	5	5	5	4	0	0	11	11
Pouches priming	10	10	10	8	0	0	0	0
Screws elevating	10	10	10	8	0	0	0	22
Sights gunners	10	10	10	0	0	0	0	0
Spikes gun spring double	20	20	20	16	0	0	0	0
" gun jagged	20	20	20	16	0	0	44	44
" relievers	20	20	20	16	0	0	0	0
Spunges with rammer heads	20	20	20	16	0	0	44	44
Tompions with collars	10	10	10	if muz caps not used.				
Washers drag	50	50	50	40	0	0	0	0
Wires priming	20	20	20	16	0	0	44	44
Wedges small iron	0	0	0	0	0	0	44	44
Wrenches common	10	10	10	8	0	0	0	0
Yokes pole or leading	1 to every pair of Bullocks including spare.							

TRAIN No. 3.

Ordnance Brass	0	0	0	0	4	0	0	6
" Iron	0	10	0	4	0	0	6	0
Carriages with Limbers	0	10	0	4	4	0	0	0
Beds, Iron	0	0	0	0	0	0	6	0
" Wooden	0	0	0	0	0	0	0	6
Aprons canvas gun	0	10	0	4	0	0	0	0
Bits Gimblet	0	10	0	4	0	0	6	6
" Gun	0	10	0	4	0	0	6	6
Bearers iron for red hot shot	0	30	0	0	0	0	0	0
" leather for loading 5½ and 8 inch shells	0	0	0	1100	0	0	5000	2136
Boxes store	0	10	0	4	0	0	0	0
" Tube (when tubes or quick match are used)	0	10	0	4	0	0	6	6
Buckets water gun	0	10	0	4	0	0	6	6
Caps canvass for spunges	0	20	0	8	0	0	12	12
" " for How. & Mortr. muzzles	0	0	0	4	0	0	6	6
Chains draft pole	0	10	0	4	0	0	0	0
" " leading	1 to every pair of leading bullocks							
" locking	0	10	0	4	0	0	0	0
Clip bands pole yoke	0	20	0	8	0	0	0	0
Clippers portfire on blocks	0	10	0	4	0	0	6	6
Coins for Mortars	0	0	0	0	0	0	12	6
Drag ropes common sets	0	20	0	8	0	0	0	0

TRAIN No. 3, continued.

ORDNANCE AND IMPLEMENTS.	Guns.			Howtz.		Mortars.		
	24 Pdr.	18 "	12 "	8 Inch.	24 Pdr.	10 Inch.	8 "	5½ "
Drifts vent	0	10	0	4	0	0	6	6
Esses iron	0	60	0	24	0	0	0	0
Hammers claw	0	10	0	4	0	0	0	0
" wrench	0	10	0	4	0	0	6	6
Handspikes common	0	40	0	16	0	0	0	12
" traversing	0	40	0	16	0	0	0	0
" " iron	0	0	0	0	0	0	12	0
Hatchets hand	0	10	0	4	0	0	6	6
Kegs for tar and grease	0	10	0	4	0	0	0	0
Keys for cap squares	0	60	0	24	0	0	0	0
Ladles with wadhooks	0	10	0	0	0	0	0	0
Linchpins	0	60	0	24	0	0	0	0
Linstocks with cocks	0	5	0	2	0	0	3	3
Pouches priming	0	10	0	4	0	0	0	0
Screws elevating	0	10	0	4	0	0	0	6
Sights gunners	0	10	0	0	0	0	0	0
Spikes gun spring double	0	20	0	8	0	0	0	0
" " jagged	0	20	0	8	0	0	12	12
" relievers	0	20	0	8	0	0	0	0
Spunges with rammer heads	0	20	0	8	0	0	12	12
Tompions with collars	0	10	0	If muzzle caps are not used.				
Washers drag	0	50	0	20	0	0	0	0
Wires priming	0	20	0	8	0	0	12	12
Wedges small iron	0	0	0	0	0	0	12	12
Wrenches common	0	10	0	4	0	0	0	0
Yokes pole or leading	One to every pair of Bullocks including spare.							

As the 24 Pounder Howitzers are to be fitted up as laid down for field batteries,* except having a larger proportion of Ammunition, their implements are not mentioned in the foregoing tables.

Spare carriages and Mortar beds, to be provided in the Magazines at the rate of one to each piece of Ordnance, and to be taken on service to such extent as the nature of the service and country to be travelled over, may render necessary.

* Vide page 119.

AMMUNITION AND LABORATORY STORES.

Ammunition and Laboratory Stores.	Train No. 1. No.	Train No. 2. No.	Train No. 3. No.	Remarks.
Ammunition, viz.				
Powder Ordnance .. lbs.	593418	346187	115281	
" Musketry ... "	92987	57949	22610	
" Mealed ... "	......	......	......	Used in priming Fuzes, &c.
Round shot .. 24 Pdr.	24000	10000	0	
" " ... 18 "	12000	10000	10000	
" " ... 12 "	12000	10000	0	
Shrapnell Shells 24 "	5352	2868	684	With collars of tin.
" " 18 "	1200	1000	1000	
" " 12 "	1200	1000	0	
" " 8 Inch	3900	2700	1100	
Common " 10 "	3000	0	0	
" " 8 "	21000	15000	5000	
" " 5½ "	11808	7272	2136	
Pound shot 100 in each charge for 10 Inch, and 50 in each charge for 8 Inch. Rounds	1800	1100	300	
Canister.				
For 24 Pdr. 8 oz. balls Rounds	2400	1000	0	
" 18 " 8 " " Rounds	1200	1000	1000	
" 12 " 3 " " Rounds	1200	1000	0	
Carcasses 10 Inch	60	0	0	
" 8 "	420	300	100	
" 5½ "	480	300	100	
Antimony	....	....	......	Used in Carcass and light ball composition.
Bags serge Cartridge empty for fixed Ammunition				
24 Pounder $\frac{1}{3}$ shots weight ...	40500	16875	0	
Loose Ammunition do. $\frac{1}{3}$ shot's weight ...	5400	2250	0	
Fixed " 18 Pdr. $\frac{1}{3}$ short's weight	20250	16875	16875	
Loose " 18 $\frac{1}{3}$ short's weight	2700	2250	2250	

Ammunition and Laboratory Stores.	Train No. 1.	Train No. 2.	Train No. 3.	Remarks.
	No.	No.	No.	
Fixed Ammun. 12 pdr. ⅓ shot's	20.250	16.875	0	
Loose ,, 12 ,, weight.	2700	2250	0	
,, ,, 8 Inch Howitzer	10.935	7290	3645	
,, ,, 24 Pdr. How. brass	3456	2304	1152	
,, ,, 10 inch Mortars..	3780	0	0	
,, ,, 8 ,, ,, ..	18.900	13.860	3780	
,, ,, 5½ ,, ,,	14.580	8910	2430	
Bags canvas	2400	1500	500	
Barrels budge	......	......	....	Used in batteries, laboratories, & for ordnance & musketry powder, also for saltpetre sulphur, &c. as reqd.
Barrels powder 50lbs.....	......	......	....	
Benches fuze with knife	32	21	7	1 for every 4 guns, 8 inch & 5½ in. mor. & 1 for every 2, 10in. mor.; 1 for every 4, 8in. how.
Blocks fuze driving	36	26	8	1 for every 2 mor. & for every 2 iron Howitzers.
,, ,, setting	36	26	8	
Boilers copper	3	2	1	
,, iron (tripod)	3	2	1	
Borax ...... lbs.......	66	41	13	At ½lb. for ea. piece of ord. 24 pdr. ho. excepted.
Bottoms for canister	....	....	......	1 for each round.
Boxes packing for shrapnell shells	....	......	......	As required.—*See boxes packing page* 202.
,, ,, for light balls	....	......	....	
,, ,, for signal rockets	....	....	....	
,, ,, for fuzes	....	......	....	
Brass cast ...... lbs.......	144	90	30	At the rate of 1lb to ea. piece of Ord
,, hammered ,, ...	144	90	30	
Brushes mealing table	84	60	20	1 to each mor. and howitzer.
,, hand	168	120	40	2 ,, ,, ,,
Buntin ...... yards	129	86	43	[ord
Candles wax ...... lbs......	288	180	60	2 lb. to ea. piece of
Cloth doosootie yards......	288	180	60	2 yards ,, ,, ,,
Cloths powder	24	16	8	
Flour	80	40	20	

Ammunition and Laboratory Stores.	Train No. 1.	Train No. 2.	Train No. 3.	Remarks.
	No.	No.	No.	
Forms laboratory.......	12	8	4	1 for each piece of Ordnance excepting 24 pdr. Howitzer, the ammunition for which is carried ready made up.
Formers cartridge 24 pdr.	24	10	0	
" " 18 "	12	10	10	
" " 12 "	12	10	0	
" " 8in. How.	12	8	4	
" " 10in. Mor.	6	0	0	
" " 8in. "	30	22	6	
" " 5½in. "	36	22	6	
" " 24pdr. Hr	......	......	......	
Fuzes shrapnell 1st size.	4680	3240	1320	1 for each round & $\frac{1}{5}$ spare.
" " 2d size	16,560	10,680	4440	1 for ea. rnd. & $\frac{1}{5}$ spare for mortras & guns, & 4 fuzes for each round of 24pdr. Howit. Ammunition both common & shrapnell sh.
Fuzes common 10 inch	3600	0	0	1 for each round and $\frac{1}{5}$ spare for common shells for Mortars and Howitz
" " 8 "	25,200	18,000	6000	
" " 5½ "	14,170	8727	2564	
Glue .... lbs.	144	90	30	1 lb. to each piece of Ord.
Grease	......	......	......	See carcasses, and kegs for tar and grease.
Grummets......	8400	5600	2800	1 for each 8in. Howitzer shell shrapnell or com.
Gunnies double pieces.	720	450	150	5 for each piece of Or dnance
Hooks lug, carrying shells	168	104	32	
Instruments gunners sets large....	8	4	2	For the use of the park,
Instruments gunners sets small....	35	21	7	1 set for every 4 guns, or every two 10in. mortrs, or every four 8in, and 5½in. Mortars and 8in. Howitzr.
Instruments fuze driving	......	......	......	Included in Instruments Gunners large sets.
Kit..............lbs...	252	156	48	3 lbs. to each How. and M. excepting 24 pdr. H.
Knives laboratory.......	144	90	30	1 to every piece of Ord.
Lanthorns horn...........	36	22	8	1 each to every 4 pieces.
" dark...........	36	23	8	
" muscovy	36	23	8	
Lead................. lbs...	60	0	0	
Light Balls.....5½ inch...	360	220	60	10 to each 5½ inch Mortar.
Line log...........skeins...	288	180	60	
Line seizing .... " ..	288	180	60	

Ammunition and Laboratory Stores.	Train No. 1. No.	Train No. 2. No.	Train No. 3. No.	REMARKS.
Match gun slow...Skeins	534	360	120	6 for each gun, and 3 for each Mortar and Howr.
„ quick (made up) yds	77,443	54,000	16,800	
Measures powder	....	....	......	Included in sets of Instruments.
Mirrors	....	......	... .	
Mixers copper	18	10	4	2 to each mealing table.
Needles sewing ...	2880	1800	600	20 to each piece of ordnance.
„ sailmakers 1st size...	720	450	150	5 to each piece of Ord.
„ „ 2d „	720	450	150	
„ packing	720	450	150	
Oil cocoanut ....lbs.	144	90	30	
„ mustard ....lbs.	240	130	40	
Paddles pulverizing ..	6	4	2	
Palms steel	144	90	30	
Pans, copper composition.	42	30	10	1 to every two Howitzers and Mortars.
„ „ cooling....	21	15	5	1 to every 4 How. & Mors.
Paper Europe portfire Qrs	144	90	30	1 quire to each piece of Ordnance.
„ Country „ „	144	90	30	
„ „ cartridge „	322	204	72	At 12 Sheets for every 100 fuzes.
„ Europe foolscap „	144	90	30	1 Quire for every piece.
Paulins waxed ...... large	90	60	30	
„ „ ...... small	90	60	30	
„ „ ..... camel	90	60	30	
Pencils blacklead ...	144	90	30	1 to each piece of ordnance.
Pendulums Gunners complete	6	4	2	
Pestles and Mortars brass...... large	18	12	6	
Pestles and Mortars brass...... small	18	12	6	
Pincers loading 8 in how.	12	6	3	
„ „ Mortar ..	......	....	.. ..	Included in Gunners Instruments.
„ Gun	144	90	30	1 to each piece of Ordnance.
Pitch	......	....	....	Used in Carcases, Light balls, and Kit.
Portfires, half common, & half blue paper ...	12,285	6,599	2,225	1 to every 10 rounds.
Rockets for signals ..	150	100	50	
„ sticks	150	100	50	
Resin	......	....	....	Used in Carcasses and Kit.
Rubbers hand mealing table	18	10	4	
Sal ammoniac ... . lbs	72	45	15	½ ℔ to each piece of Ordnance.
Salt petre pulverized	.....	....	....	See Fuzes, Rockets, Light balls, and Carcases.

Ammunition and Laboratory Stores.	Train No. 1 No.	Train No. 2. No.	Train No. 3. No.	Remarks.
Scales large wooden.	3	2	1	
„ „ copper.	9	6	3	
„ medium „	9	6	3	
„ small „	9	6	3	
Scissors laboratory....	144	90	30	
Searchers with relievers...	6	4	2	
„ single prong......	6	4	2	
Serge for cartridge bags. Pieces of 63 yards long and 1 yard wide....	554 and 25 yds.	330 and 22 yds.	115	This calculation is for fixed ammunition, round and loose ammunition for all other natures. What is here allowed is sufficient for the whole complement of bags as given under the head of "bags serge cartridge," a deduction must therefore be made in the number of pieces, agreeable to the number of cartridge bags carried ready made up.
Sieves brass 3 in a set sets	6	4	2	
„ lawn 3 „ „ „	12	8	4	
„ hair 3 „ „ „	12	8	4	
„ top & receiver leather	6	4	2	
Solder pewter .... lbs.	216	135	45	
Shot loose iron 1 lb. wt. for grape.				
for 10 inch mortar..........	30,000	0	0	
„ 8 „ „	75,000	55,000	15,000	
Spirits of wine............	... .	....	......	See quick match, priming [Fuzes &c. &c.
Sulphur refined.......... ..	....	....	....	See fuzes, rockets, light balls, and carcasses.
Turpentine spirits..........	0	0	0	
Tables laboratory..	9	5	2	
„ mealing............	9	5	2	
Tallow..............	.....	....	....	Used in Carcasses and Kit.
Tents European N. C.	24	15	5	For Laboratory work.
„ Paul Golundauze	12	8	3	
Thread worsted...... .lbs.	144	90	33	
„ cotton.............	....	....	....	See quick match.
„ silk	....	....	......	See bags cartridge.
Tubes copper or quill when used....	140798	95,385	26,744	1 to each round & ¼ spare.
Twine country No. 1. lbs.	275	197	60	
„ „ „ 2. „	621	422	135	
„ „ „ 3. „	125	84	22	
Wads compressed for 24 pounder..	36,000	15,000	0	Oakum to be sent instead, and used as package as far as possible.
„ „ for 18 pdr.	18,000	15,000	15,000	
„ „ for 12 pdr.	18,000	15,000	0	
„ round for red hot shot	....	.....	.....	The number of rounds per gun.
Wax bees... .. .. lbs.	504	309	90	
Wrappers curwah 24 pdr.	12,000	5,000	0	
„ „ 18 „	6,000	5,000	5,000	
„ 12 „	6,000	5,000	0	

GENERAL STORES.

GENERAL STORES.	Train No. 1.		Train No. 2		Train No. 3.		REMARKS.
	No.	Weight.	No.	Weight.	No.	Weight.	
	No.	lbs.	No.	lbs.	No.	lbs.	
Axes felling.	132	858	82	533	26	169	1 for each piece of Ordnance, Gun, iron Howitzer, or Mortar.
„ pick	132	858	82	533	26	169	
Axletrees iron siege gun or Limber	15	4800	10	3200	4	1280	1 to every 4 guns, and to every 4 iron Howitzers.
„ „ cart or waggon	7	910	4	520	1	130	1 to every 8 carts, taking 2 carts for ea. 10in. 1 for ea. 8in. [& 1 for four 5½ inch.
„ „ wooden mortar bed	18	126	11	77	3	21	1 to every 2 mortar beds.
Bamboos large	150	0	60	0	30	0	For general purposes.
„ small	6000	0	4000	0	2000	0	
Banner rolls with staves	60	349	38	221	14	81	For marking out the Park, &c. for signals, 1 to ea. gun & [howitz
Barrels for tar	16	6128	10	3830	4	1532	1 to every 3 guns for greasing wheels, &c.
Blinds embrazures gun & howitzer	60	0	38	0	14	0	
Chains measuring	4	52	2	26	1	13	
Chalk ..lbs.	0	132	0	82	0	26	One pound for each piece of Ordnance.
Charcoal,	0	14784	0	9184	0	2912	One cwt. do. do. do.
Copper sheet thick ..sheets	60	2580	38	1634	14	602	One sheet to each gun and howitzer.
Flags gun	3	42	2	28	1	14	
„ park	3	30	2	20	1	10	
Frontlets for 24 Pounder	24	0	10	0	0	0	
„ „ 18 „	12	0	10	0	10	0	
„ „ 12 „	12	0	10	0	0	0	

Ghurries with mallets	3	307½	2	205	1	102	
Glasses hour	6	0	4	0	1	0	
Gins with blocks and tackles complete	3	4278	2	2852	2	1426	
Hides corah	132	1254	82	779	26	247	1 to each piece of Ordnance.
Hooks shell ... pairs	6	9	0	0	0	0	
Jacks hand large	4	640	2	320	1	160	
„ „ small	4	520	2	260	1	130	
„ „ lever	6	156	4	104	2	52	
Iron Europe of sorts, viz.							
Flat bar 6½ inches	0	7392	0	4592	0	1456	Half a cwt. to each piece of Ordnance. The quantity of each kind to depend on the Officer receiving charge of the Train.
„ „ 3 „							
Bolt......1½ „							
„ ...... ¾ „							
„ ..... ½ „							
Line seizing for general use...skeins	396	396	246	246	78	78	Three skeins to each piece.
Mamoties	132	1056	82	656	26	208	1 to each piece of Ordnance.
Oakum	0	132	0	82	0	26	For chickledars to be extra to what is required for packing.
Perambulators	6	138	4	92	2	46	
Pickets park	528	5808	328	3608	104	1144	Four to each piece of Ordnance.
Platforms Gun	48	0	30	0	10	0	One to each piece weight not known.
„ Howitzer	12	0	8	0	4	0	
„ Mortar	72	0	44	0	12	0	
Rammers earth	70	1400	40	800	15	300	One to every two pieces of Ordnance nearly.
Ratline ... Coils	13	520	8	320	3	120	1 to every ten pieces nearly.
Rods measuring of sizes 10 feet.	13	33	8	20	3	8	
„ „ „ 6 „	13	20	8	12	3	5	
ROPE EUROPE VIZ.							
5½ inch for Gin falls Coils	3	2541	2	1694	1	847	1 coil to each gin. Extra to one fall for each gin and 1 pair of Drag ropes to each gun.
4 „ for Drag ropes „	20	10500	13	6825	5	2625	1 coil to every 3 guns & Howitz.

GENERAL STORES.

General Stores.	Train No. 1.		Train No. 2.		Train No. 3.		**Remarks.**
	No.	Weight.	No.	Weight.	No.	Weight.	
	No.	lbs.	No.	lbs.	No.	lbs.	
Sheep skins..	84	168	52	104	16	32	
Shovels	66	330	41	205	13	65	One of each to every two pieces of Ordnance.
Spades	66	330	41	205	13	65	
Steel Europe blistered..........	0	132	0	82	0	26	One pound to each piece of Ordnance.
Stones grinding with troughs......	6	2580	4	1720	2	860	
Waxcloth pieces..................	132	982	82	610	26	194	For package of powder barrels, and protection of elevating screws from wet, also Fuzes &c. &c ---this to be extra to original package.
Tools chests of Carpenters.........	15	0	10	0	4	0	One each to every four pieces of Ordnance.
Do. do. Smiths............	15	0	10	0	4	0	
Do. do. Coopers.........	15	0	10	0	4	0	
CARTS FOR TRANSPORTING MORTARS, STORES AND ARTIFICER'S TOOLS.							
Carts Mortar with Limbers........	51	0	28	0	8	0	Two for every 10 Inch, one for every 8 Inch, and one for every four 5½ Inch Mortars.
,, Platform without Limbers......	0	0	0	0	0	0	As required, to the extent that Magazines can furnish.
,, Store with Limbers...........	60	0	38	0	14	0	For Carriage of stores requiring to be protected from the weather, and that should not be exposed to travel on common hackeries; also for Artificers Tools.
,, Sling......................	6	0	4	0	2	0	When sling waggons are not used, and only a proportion and not a double set of gun carriages taken.
Waggons Sling or transport.......	60	0	38	0	14	0	If required, and a spare set of gun carriages are not taken
,, Ammunition...........	0	0	0	0	0	0	As required, to the extent that magazines can furnish, Used for carrying cartridges ready filled and other stores requiring protection from the weather.

CARRIAGES SIEGE, GUN SPARE AND SPARE CARTS, ALSO SPARE WHEELS, &c. &c.

Beds Mortar wooden..........5½ Iuch	6	0	4	0	1	0	One sixth spare nearly.
Carriages, Cart Mortar	10	0	6	0	2	0	About one fifth spare.
„ „ Store..............	12	0	8	0	3	0	
„ with Limbers........24 Pdr	....	......	......	......	......	......	To be taken as required to the amount of one spare carriage to every one in use, when the sling waggons are not employed for the carriage of the guns.
„ „ „ ....18 „	....	......	......	......	......	......	
„ „ „ ....12 „	......	......	......	......	......	......	
„ „ „ ...8 In. How-	......	......	......	......	......	......	
Poles cart Mortar or Store.............	11	0	7	0	3	0	About one tenth spare.
„ Siege gun Carriage	6	0	4	0	2	0	
Wheels cart Mortar or Store....... ..	11	0	7	0	3	0	About one to every 10 Carts.
„ Siege gun carriage............	12	0	8	0	3	0	One to every five carriages.
„ „ Gun limber carriage ..	12	0	8	0	3	0	

HALF WROUGHT MATERIALS.

Axletree beds, Cart and Limber......	11	0	7	0	3	0	About one to every 10 Carts.
„ „ Siege gun Carriage....	12	0	8	0	3	0	Do. do. 5 Carriages.
Beams howitzer.............8 Inch	3	0	2	0	1	0	One to every four Howitzers.
Cheeks Siege gun Carriage.....24 Pdr	6	0	3	0	0	0	About one to every four Carriages.
„ „ „ „ ...18 „	3	0	3	0	3	0	
„ „ „ „ ..12 „	3	0	3	0	0	0	
„ Howitzer... ....8 Inch	3	0	2	0	2	0	One to every 4 Carriages except in Train No. 3.
Felloes cart.................	111	0	66	0	22	0	One to each Cart.
„ Siege gun Carriage..........	60	0	38	0	14	0	One of each to each Carriage.
„ „ „ limber...............	60	0	38	0	14	0	
Naves Cart Mortar and Store (brass)	11	0	7	0	3	0	About one to every 10 Carriages.
„ Siege Carriage........ („)	12	0	8	0	3	0	One to every five Carriages.
Poles cart......	22	0	14	0	5	0	
„ Siege gun Carriage....	12	0	8	0	3	0	
Spokes cart..............................	222	0	132	0	44	0	Two to each Cart.

HALF WROUGHT MATERIALS.	Train No. 1.		Train No. 2.		Train No. 3.		REMARKS.
	No.	Weight.	No.	Weight.	No.	Weight.	
	No.	lbs	No.	lbs.	No.	lbs.	
Spokes Siege gun Carriage	120	0	76	0	28	0	Two to each Carriage.
,, ,, ,, limber	120	0	76	0	28	0	
Transoms viz.							
24 Pdr. Breast	6	0	3	0	0	0	
Centre	6	0	3	0	0	0	
Trail	6	0	3	0	0	0	
18 Pdr. Breast	3	0	3	0	1	0	
Centre	3	0	3	0	1	0	
Trail	3	0	3	0	1	0	
12 Pdr. Breast	3	0	3	0	0	0	
Centre	3	0	3	0	0	0	
Trail	3	0	3	0	0	0	
8 Inch Howitzer Breast	3	0	2	0	1	0	
Centre	3	0	2	0	1	0	
Trail	3	0	2	0	1	0	
Sliding	3	0	2	0	1	0	

FOR THE EQUIPMENT OF THE ABOVE MORTAR AND OTHER CARTS, ALSO FOR SPARE CARRIAGES AND SPARE CARTS.

Chains, draft leading for carts Mortar and Store......	....	....	....	....	....	....	One to every pair of leading bullocks.
,, ,, ,, Siege carriages spare	....	....	....	....	....	....	
,, ,, ,, Sling cart......	....	....	....	....	....	....	
,, ,, ,, ,, Waggon......	....	....	....	....	....	....	
,, ,, ,, for spare Bullocks...	....	....	....	....	....	....	
,, Draft pole yoke for Mortar carts including spare cart....	61	,,	34	,,	10	,,	One to each cart.
,, Draft pole yoke for store carts including spare carts.	72	,,	46	,,	17	,,	One to each cart.
,, Draft pole yoke for sling carts	6	,,	4	,,	2	,,	One to each carriage.
,, ,, ,, ,, Waggons......	....	....	....	....	....	....	One for each taken with the Train.
,, ,, ,, for spare siege carriages 24 Pdr.	....	....	....	....	....	....	One for every spare carriage taken with the Train.
,, ,, ,, ,, ,, ,, 18 ,,	....	....	....	....	....	....	
,, ,, ,, ,, ,, ,, 12 ,,	....	....	....	....	....	....	
,, ,, ,, ,, 8 In Howitzer	....	....	....	....	....	....	
,, Locking..........24 Pdr.	....	....	....	....	....	....	One to every carriage.
,, ,, ...18 ,,	....	....	....	....	....	....	
,, ,, ...12 ,,	....	....	....	....	....	....	
,, ,, ...8 In Howitzer	....	....	....	....	....	....	
Chains locking for Mortar and store cart...............	133	,,	80	,,	27	,,	
Clip band pole yoke for spare siege carriages	....	....	....	....	....	....	One for every spare carriage.
Dragropes common ,, ,, ,,	....	....	....	....	....	....	One pair or set for each carriage.
,, ,, for Mortars and store carts	133	0	80	....	27	0	
Esses Iron ,, ,, ,, ,, ,,	266	0	160	....	54	0	
,, ,, for siege carriages......	....	....	....	....	....	....	Three to every spare carriage.

	Train No. 1.		Train No. 2:		Train No. 3.		Remarks.
	No.	Weight.	No.	Weight.	No.	Weight.	
	No.	lbs.	No.	lbs.	No.	lbs.	
Handspikes common	...	...	...	...	...	...	Two of each to every spare carriages.
" traversing	...	...	...	...	...	...	
Kegs grease	133	0	80	0	27	0	One to every cart.
Keys for cap squares	...	...	...	...	...	...	Six to every spare carriage.
Linch pins	...	...	...	...	...	...	
Screws elevating 24 Pdr.	...	...	...	...	...	...	One to every spare carriage.
" " 18 "	...	...	...	...	...	...	
" " 12 "	...	...	...	...	...	...	
" " 8 Inch Howitzer	...	...	...	...	...	...	
Washers drag for Mortar and Store carts.	798	0	480	0	162	0	
Washers drag	...	...	...	...	...	...	Six to each spare carriage.
Yokes	...	...	...	...	...	...	One to every pair of Bullocks with the Train.
Yokes for spare bullocks	...	...	...	...	...	...	

(Signed)
J. Stevenson, Lieut. Colonel, President.
J. Tennant, Lieut. Colonel.
C. Graham, Major H. A.
G. Conran, Major H. A.
R. S. Seton, Captain H. A.
W. Whitlie, Brevet Captain H. A.

(True Copy)

(Signed) J. Stuart, Lieut. Colonel.
Offg. Secy. to the Govt. of India.
Military Department.

SUPPLEMENT TO THE SIEGE TRAIN PROCEEDINGS.

The Board since their proceedings of the 5th September 1836, having had an opportunity of seeing a Gyn of the pattern originally recommended by them,* made up and worked at Dum Dum, request that their former resolution may be changed; as they are of opinion, that the complication of the machine is greater than was formerly in use, in a degree far exceeding any advantage to be expected from it. They therefore now propose to retain a Gyn of the common description, as in use at Bengal and Bombay as well as formerly at Madras.

(Signed)
J. Stevenson, Lieut. Col. H. A. President.
J. Tennant, Lieut. Colonel.
C. Graham, Lieut. Colonel H. A.
R. S. Seton Captain. H. A.
W. Whitlie, Brevet Captain.

Fort William,
30*th Jany*. 1837.

(A True Copy)
Signed J. Stuart, Lieut. Colonel.
Offg. Secy. to the Govt. of India.
Military Department.

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* Vide Page 154.

FROM
THE SPECIAL BOARD OF ARTILLERY OFFICERS.

To

MAJOR GENERAL SIR W. CASEMENT, K. C. B.

Secretary to the Government of India
Military Department.

SIR,—We have the honor to transmit Proceedings of our Board, relative to the formation of Depôts of Instruction at the three Presidencies; and which we trust, will meet with the approval of the Right Honorable the Governor General of India in Council.

We avail ourselves of this opportunity to state, that the Principal Commissary of Ordnance, has commenced the construction of the 24 pounder Howitzer, and 9 pounder Gun Carriages, and we hope to submit, at an early period, a report on the Carriages constructed under our superintendence, for the service of the Indian Artillery; and on such others of the different Presidencies in the Magazine at Dum Dum, as we have deemed it necessary in the course of our duty to put to experimental proof.

FORT WILLIAM,
10*th Oct.* 1837.

(Signed) J. STEVENSON, Lt.-Col.
Bombay H. A. President.
„ J. TENNANT, Lt.-Col.
Bengal Artillery.
„ C. GRAHAM, Lt.-Col.
Bengal H. Artillery.
„ R. S. SETON, Capt.
Madras H. Artillery.
„ WM. WHITLIE, Bt.-Capt.
Bombay H. Artillery.

(True Copy)

(Signed) J. STUART, Lt.-Col.
Offg. Secy. to the Govt. of
India Mily. Department.

FORT WILLIAM, 14*th June*, 1837.

PROCEEDINGS OF THE SPECIAL BOARD OF ARTILLERY OFFICERS.

Read letter No. 109 of the 12th June from Major General Sir W. Casement, K. C. B., Secretary to the Government of India Military Department; and resolved to adjourn to afford opportunity for considering the same, before giving a reply thereto.

FORT WILLIAM, 31*st August*, 1837.

1. The Members of the Board having duly considered the letter laid before them on the 14th June 1837, now proceed to give their decision thereon.

2. The Board are unanimously of opinion, that it is necessary to the success of any arrangement they can suggest, for the professional instruction of the young Officers, and Recruits destined to serve in the Indian Artillery Corps, that they should be certain of remaining at the station, where the Depôt for such instruction is established, so long as shall be necessary to make them perfect Artillerymen. It would obviously be useless to attempt to instruct Recruits in professional duties before they have acquired a knowledge of the first principles of Military discipline; but it may nevertheless, be supposed, that the one may be acquired after the other at different stations. Although however, the formation of the Soldier, in more immediate Military training must have made some progress, before he is carried to the second stage of his tuition, the Board are of opinion, that it is neither necessary nor desirable, that this last should be delayed, until the first is completed; for the whole will be accomplished in less time by the instruction in both being carried on together, as soon as it is practicable. The means of conducting both should therefore be provided at the same station, that the service may not be deprived of the use of the Soldier longer than is necessary. But the Board observe, that this means is wanting at all the three Presidencies, more or less, agreeable to the extent of their establishments; the Drill Staff of the Regiments of Artillery being allotted to the Brigades and Battalions, and the Head Quarters of the Brigades and Battalions being scattered at different stations of their respective Presidencies, distant from that at which the Recruits are first received. At this last station consequently, there are no means of carrying on instruction beyond what the fractional part of the Staff of the whole Corps can supply; and this fractional part is in-

adequate to the full accomplishment of the end, which the whole were no doubt destined to fulfil. It has been found impracticable therefore, to conduct the Military training of the Recruits to a perfect conclusion at the stations where they first land; it has been necessary in fact to hurry them away to their respective Troops and Companies, as quickly as possible, for fear of overburdening the Head Quarters; and it would be difficult after this dispersion has once taken place, to devise any mode, of collecting them again, for professional instruction, which has consequently, been heretofore, very much left to chance. The Board feel themselves unable therefore, to separate the consideration of the means of supplying this professional deficiency, from that of improving the system of giving the mere Military Drill at all the Presidencies.

3. The Board could hardly consider themselves at liberty to suggest so great a change in existing arrangements, as to collect the Head Quarters of all the Brigades and Battalions, at one station for this purpose, even were it likely to answer the end proposed; for they observe, that the Commanding Officers of Battalions and their Staff perform other important functions, which would in that case require to be provided for, by substituting Division Commanders, and additional Staff at a considerable expense, and fully as great they believe, as would be necessary to effect the object by other means. But they consider besides, that the minute divisions of the instructions which would be the consequence of employing so many different Commanders,would be injurious, as tending unnecessarily to increase the chance of deviations from uniformity. The Board observe, that this consideration is, in their judgment, of more weight in a Corps which acts greatly by detachment, than in those which always act in a body; because, from the union of such detachments, its main force in the field is generally formed, and the want of uniformity of discipline, even in minute points, is then most sensibly experienced. For this reason, the Board would be disposed to consider that the fundamental instruction of Artillerymen, should be conducted under one Superintendent only, were there not other objections which render it unadvisable But still, the Board think that the number of Instructors should be restricted as much as is practicable, consistent with other objects.

4. The Board are of opinion, that instruction in the professional duties of Artillerymen, which are to be acquired only in a Laboratory, or Magazine, are of too complicated a description, and must be too ill defined by any rules which they

could lay down, to make success in teaching them, independent altogether of the capacity and talents of the teacher. It is necessary therefore, that one individual only should be so engaged, to insure a perfect uniformity of system, and to establish the general principles for the whole Corps. But if this Officer be also entrusted with the Military training of the Recruits, his duty would be swelled to a degree, that would in the opinion of the Board, render it impossible for him to perform them ; and the variety of acquirements which it would then be necessary for him to possess, would make it exceedingly difficult, if not impossible, to find individuals duly qualified. It is therefore desirable, in the opinion of the Board, to separate the professional instruction from the superintendence of the Military training of the Recruits. Inconvenience would also be experienced in retaining the Military training under one person, whether for the instruction of the Horse, or Foot Artillery Recruits, for instance, though similar to a certain extent is yet very different in many essential points ; and those which agree, must be so blended with those in which they differ, that the same routine of instruction could not be observed for both. A separation of the instruction of the Recruits of these two branches of the Artillery, must therefore be provided for. But besides this, if Recruits are kept altogether distinct from the older Soldiers, having separate Commanders while under instruction, they lose the opportunity of acquiring that gradual initiation into their habits and usages, which is not an unimportant part of their Military training ; and they are moreover kept aloof from the general body of the Officers of the Corps, by which that feeling is not created, that it is desirable to promote towards each other ; and in a Corps so much broken up, it is difficult afterwards to acquire this feeling if not promoted at Head Quarters at first joining. The Board consider, that the rules of the Military training of Recruits being well defined, it is not liable to the same chances of irregularity even when labor is subdivided, provided the instructors are not too numerous ; and they rather recommend, therefore, that this duty should be conducted by the usual means, subdividing the labor between so many only of the Brigade, and Battalion Commanding Officers, and Staff, as should bring it within their compass, when combined with their other duties ; limiting the number to what may easily be minutely overlooked by the Senior Officer of the Station, or the Commandant of the Regiment.

5. In order to form some idea of the extent of the duty to be provided for, Lieut.-Colonel Tennant furnished a

Statement (marked A.) taken from the records of the Assistant Adjutant General of Artillery's Office, in Bengal, from which it appears, that on an average of the two periods of 10 years each, one being taken before, the other after the last formation of the Army in 1824, the amount of casualties in that Presidency may be assumed at $10\frac{3}{4}$ per cent. in the Horse Artillery, and 12 per cent. in the Foot Artillery, annually: the difference of the two apparently arising from the greater proportion of Non-Commissioned Staff in line appointments, supplied from the latter than from the former. Were the established number of these Staff added, as it ought to be to the strength of the Foot Artillery, the difference would be nearly reconciled; and in the absence of documentary information extending over a period of the same length, relating to the other Presidencies, the Board unanimously adopt the rule of casualty thus ascertained, as sufficiently correct, for the whole three. But assuming this rate, it appears from a memorandum annexed (marked B) that the number of Recruits that will be annually necessary to keep up the present strength of the Establishments, including the modifications of the Troops and Companies, already proposed by the Board, cannot in Bengal be less than 400 men, in Madras it cannot be less than 250, and in Bombay, not less than 150. As one year will in the opinion of the Board, be the least time, requisite to instruct a recruit, they assume consequently, that this will be nearly the constant number in each Presidency for which these arrangements are to be made; and believing that the Commanding Officers and Staff of a Brigade or Battalion, will not be able, in addition to their other duties, to attend to the drill, and instruction of more than 140, or 150 men, they arrive at the determination, that the Staff of one Brigade of Horse Artillery, at each of the Presidencies; of two Battalions of Foot Artillery in Bengal, and one each in Madras, and Bombay, should be allotted for the Military training of the Recruits. Additional assistance will no doubt be necessary in the subordinate details, which the Board propose to supply as follows.

6. If all the Recruits are fully instructed before they are finally distributed to their Troops or Companies, the proportion of Non-Commissioned Staff allowed for drill only, may, the Board think, be considerably diminished in the detached Brigades, and Battalions; and what is withdrawn may be concentrated with those Brigades and Battalions conducting the drill. With this view, they propose to withdraw the Drill Sergeant of each Brigade and Battalion, and to order them all to do duty with the Drilling Brigades or

Battalions.—The same rule would apply to Drill Corporals, if continued as they are at present a component part of the Brigade or Battalion Staff, for the Board think, that the Serjeant Major assisted by the Quarter Master Serjeant, is sufficient to conduct the occasional duties of a detached Battalion, under the circumstances proposed, but if the Drill Corporals are, as the Board has before recommended, transferred to Troops and Companies, those at Head Quarters of the Drilling Brigades and Battalions, will of course assist, and additional aid may be drawn when necessary, to a sufficient extent from the Drill Corporals of those Brigades and Battalions, where Troops and Companies, are most concentrated.

7. In like manner to form the riding establishment, those Brigades of Horse Artillery where Troops are most concentrated at their Head Quarters, would afford such assistance from the Troop rough riders, and Brigade riding Staff, as may be necessary to the Staff of the department of the Drilling Brigades. At all the three Presidencies however, the Board are decidedly of opinion, that the interests of the service require an establishment of Horses for the riding school, distinct from those of the Troops at Head Quarters. When we consider the incessant labor in the lunge, of perfecting all the Horse Artillery Recruits, and many young Officers, both of the Horse and Foot branch; which the Board have already stated to be considered by them a most important object; it would, they think, infallibly impair the efficiency of the Horses of the Troops, particularly as remounts are admitted so young into the service, and the orders of Government, prohibit their being put to work till a year after joining. Of these Horses too, the riding establishment would be deprived in case of War, when the Troop might be required for service, and when the operation of the riding school would become of the greatest importance, they recommend therefore, that an establishment of Horses may be allowed for the riding school of each Presidency equal in number to admit ⅓ the number of Recruits, or, in Bengal 90 horses, Madras 60* horses, and Bombay 40 horses. The Board do not think however, that great expense need be incurred in keeping up the strength of this Establishment; for they believe, that a sufficient number of the horses, may always be selected from those annually cast from the Troops, and sold for almost nothing, which would

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* This number includes a proportion of 10 horses for the Native Troops at Madras, but in Bengal this number must remain with the respective Native Troops, which cannot be recruited in the lower provinces.

nevertheless be able to undergo for some years the ordinary duties of a riding school.

8. The Board would here consider the arrangements for the Military training of the recruits to be complete, did they not think it necessary to offer a few observations on their care in Barracks. This is at present provided for by no other means, than dividing them among the Troops and Companies at the Stations where they first join, which however, have no additional Officers or Non-Commissioned Officers to assist in superintending them; did the training of the Recruit depend only on his acquiring, certain Military notions, and habits, this mode might not be objectionable; but when we advert to the complete change of habit and opinions, which must take place in a strange country and ungenial climate, the direction of their conduct in this respect, cannot but be of material importance in any system of instruction which may be adopted. The Board have no hesitation in saying, that this end is very imperfectly answered under existing arrangements, when from want of sufficient means to keep a proper observation over them, they most usually fall into the hands of the crafty, and debauched characters, who are ever ready from interested motives to betray them into bad habits, to the destruction of all hopes of making them useful subjects.

9. Government have also been pleased to order, that an advance may be drawn for each Recruit to equip him in light clothing, and other equipments suitable to the climate, which is to be repaid by a moderate deduction from his pay monthly, as it subsequently falls due, if advantage is taken of this, to the full extent, the amount could not be liquidated in much less than a year, and in the mean time the Captain of the Troop or Company, whose duty it becomes to draw the amount, is held responsible for its recovery. But before this, the exigencies of the service most probably require, that the Captain himself shall be removed, and if not, it is nearly certain that the Recruit will be so; the responsibility of the Captain however continues, notwithstanding the power of recovery is transferred to another Officer, and that Officer in return becomes personally responsible to the Captain, with whom therefore, an open account is necessary, and in process of time such accounts multiply until by frequent changes they are formed with nearly every Troop or Company in the Regiment; now the Captains have no extra assistance to enable them to keep such accounts, or to carry on the extensive correspondence which

they necessarily draw on him; he has to depend entirely on the Pay Serjeant of his Company, and Company's contingent allowance to supply this extra demand, and he has besides to meet the increase of expense arising in the Company itself, by the constant addition of at least ⅓ extra men to its fixed establishment. The expense of writers, stationary, repairs of arms, and other contingencies under such circumstances, not unfrequently absorb the present command allowance, as well as the contingent allowance, so that besides incurring great personal responsibility, the charge of a Company is complained of as a source of expense, and is shunned by every one who can get relieved from it. Under these circumstances, it will not excite surprise, that the details of these Companies, which for the sake of the Recruits, should be the best regulated, are in general the worst; and that the advances drawn for their equipment, are regulated by the probability of speedy adjustment, rather than the interests of the Recruits.

10. The Board think it of great importance that such a system should be changed, and with a view of providing the remedy, they propose that the Recruits allotted to each of the Drilling Brigades or Battalions on first joining, should be formed into a Company or Troop by themselves, the charge of which should devolve on the Adjutant: this Officer should receive the usual contingent allowance as for a Troop or Company, and in the Horse Artillery should also have charge of the riding school Horses, being assisted by a Pay Serjeant to enable him to regulate the pay details of the Company. But in addition thereto, he should be allowed one extra clerk on his Staff establishment, who under the denomination of Pay Clerk, would keep the accounts of the advances with Government, and the several Officers, with whom they may be required. To provide Non-Commissioned Officers for this Troop or Company, the Board propose, that one of the Drill Serjeants may do the duty of Staff Serjeant, and as the other Troops and Companies, will be diminished in strength, while their Recruits are under Drill, each Brigade and Battalion may be called on to supply, 2 Serjeants, 2 Corporals, and 4 Bombardiers, which in the first instance should be selected for their steadiness, and qualifications, from those of the whole Brigades, and Battalions, and afterwards distributed, so as to give a Serjeant, or a Corporal, from alternate Troops or Companies, and a Bombardier from each. The subsequent pro-

motion, of these men should be regulated by the Commanding Officer of the Battalion, with which they are doing duty; vacancies in the Drill Serjeants should be supplied from them in the first instance, the other promotion taking place from the next lower rank, and the vacancies which will then be occasioned among the Bombardiers, being filled up by special selection, either from the Bombardiers or Gunners of the Brigade or Battalion whose Bombardier becomes promoted in the Recruit Company. This will establish the reward of promotion in this particular line, among the men who are employed in it, and it will fall into the Brigades and Battalions, in proportion to the care taken to select qualified men, if the same attention is paid to this point, the chance of promotion would then be equal.

11. All young Officers on first arriving in the country, would of course join this Troop or Company, and do the ordinary Subaltern duty of it, and to assist the Adjutant, one or even two Subalterns if necessary, may be selected from the older Subalterns at the Station, to join it as a temporary arrangement, which may be made by the Commanding Officer. The interior details of the Company may be managed by the senior Officer, under the Adjutant's directions, that it may become a means of teaching him the duties of Commanding a Troop, Company or Detachment, but that there may be no objection to remove him as frequently as may be necessary to extend this course, he should have no responsibility for accounts or other papers.

12. The young Officers and Recruits, should remain attached to this Troop or Company, until they are *perfectly* qualified to join in Brigade or Battalion exercise, during which time they should be put on no Guard, or Sentries, nor take any other duty of considerable exposure or of responsibility. This indeed is already required by the existing rules of the Bengal army, but in practice has become a dead letter, from the impossibility of observing it under the arrangements in common usage. The Board however think, it may be insisted on with advantage, and during this time the Recruits should take no other duties than those of their own Barracks, and under their own Officers. Their duties as Sentries and Guards, should then be fully explained to them, they should frequently have the articles of War and other Standing Orders read to them on their parades; and they should be made fully acquainted, in every possible manner, not only with the existing rules of the service, but with the obligations they incur to obey them.

13. When the time of his probation shall expire, and the Recruit has been fully instructed in his Military duties, he should be removed to one of the regular Troops and Companies at the station. This may take place of course some time before he shall have completed his professional instruction, and therefore, although he might join in all the duties and exercise of the Brigade or Battalion from this time, exception should be made to those which interfere with his attendance at the professional Depôt. He would now be treated as far as possible, as a fully instructed Soldier, only it must be carefully observed, that until his professional instruction is finished, he should not (unless in cases of emergency) be employed on any duty beyond the station, nor be ordered to join any Troop or Company stationed elsewhere.

14. The Board is of opinion, that the most suitable stations for the Depôts of Instruction, to be established, are those to which it has been found most convenient, to send the Recruits of the several Presidencies as they arrive in the country.

15. The Board will conclude their observations on the Military training of the Recruits, by begging the particular attention of Government, to the detail which they have ventured to submit, and which they trust will justify them in the conclusion, that the duties which they impose on the Commanding Officers and Staff of Brigades, and Battalions, employed as Drill Corps, are of more than ordinary importance The charge of instruction of from 130 to 150 Recruits, in addition to the ordinary details of the Battalion or Brigade, is at least double the ordinary duty of the same nature, which falls to Commanding Officers of European Regiments in Her Majesty's Service; and this with the nature of the duty, makes it of consequence, to the success of the scheme, in the opinion of the Board, that it should not be allowed to devolve on the Officers generally, who may in succession be liable to Command Brigades, and Battalions at Head Quarters, in the ordinary routine of reliefs; those Officers only should be appointed in the opinion of the Board, who are known to be well qualified to give full effect to the system, and the Officers called on to exercise those functions, should feel that they occupy a place of distinction in the estimation of the higher authorities. But this cannot, the Board would respectfully represent, be the case under present regulations, because, by forming these Depôts of Instruction within 200

miles of the Presidency, the allowances of the Officers are diminished, when compared with what they would receive beyond these limits, and removal to these stations would continue to be as it now is, shunned rather than desired. This would be most decidedly the case, where the trouble and responsibility at the same time augmented ; the Board believe indeed, that an opinion is even now very prevalent (at least in Bengal, where from the numbers affected, the contrast is more prominently felt ;) that removal to the Head Quarters of the Corps, is looked upon as a mark of displeasure used by high authority, rather than as one of approbation ; and the Board think, that no system which they could propose, would be successful under such an impression, the Board therefore under all the circumstances of the case, think it desirable to the successful Establishment of the system they have proposed, that some remuneration should be granted to the Commanding Officers, the Commissioned, and the Warrant Staff of the Brigades, and Battalions, to be employed in this duty ; and they suggest, that they should be allowed to draw the full field allowance of their respective ranks while so employed, in addition to the House rent already received at their stations.

16. When the Recruits shall have advanced considerably in their Military training, which includes their ordinary spunge exercise, they may commence their instruction in professional duties to be taught in the Depót ; for which it appears to our Board to have been more particularly the object of Government, that we should now prescribe an Establishment at each Presidency. But previously to fixing this Establishment, we shall proceed to point out what we conceive should be the amount of instruction to be provided for.

17. All young Officers and Recruits, should be taught to make the knots and fastenings in ropes, and other ligatures, frequently used in Laboratory and Ordnance purposes ; they should be taught how to fix spunge heads, and to prepare other things usually required from Magazine Establishments, to be made up for the Ordnance ; they should be taught to distinguish every implement about a Gun, ammunition waggon or limber, as well as the parts of the Guns themselves, by their technical designation ; the use of all instruments, and implements, should be explained to them and their application exemplified ; the mode of distributing the implements with the Guns, and Carriages on the march ; whether with Field Batteries or Battering trains, the mode of packing am-

munition and stores, whether in waggons or boxes, and in the latter case whether to be carried on Carts or Hackeries, or on carriage Cattle, should be fully explained; and no man should be considered perfect until he can readily superintend these operations, and direct the distribution without the assistance of the instructors. They will next be instructed in the principles of laying Guns, Mortars and Howitzers, explaining the difference between the Quadrant and Tangent scale, the intention of the different kinds of ammunition; and the proper occasion for using Round shot, Shrapnel, and Grape; the Director should therefore have a course of practice calculated to answer those ends, during which he should point out the mode of determining the distance without instruments for this purpose; and finally, the Officers and Recruits should be instructed in laying platforms, so as to do it even in the night time without noise or confusion.

18. When the young Officers and Recruits have been fully instructed in the mode of bringing their Guns and ammunition into the field, or into battery, and on their use when there; they should be taught the mode of preparing the several kinds of ammunition necessary for service, and usually made up in Magazines or Parks; each young Officer and Recruit should be required himself to obtain a certain proficiency, in the common Laboratory duties of making cases, filling portfires and fuzes; making rockets, fireballs and carcasses. This course may be extended with benefit to Laboratory duties of a less ordinary descripticn such as would be required in displays of fireworks of some extent for when they are required, it is usually expected that the Artillery Officers and men, shall be capable of superintending and assisting in their preparation; and the less frequently they are likely to be wanted in the common routine of the service, it is the more necessary that they should be practiced in the Depôt. They afford besides, an excellent practice for young Officers and Recruits, to accustom them to all the manipulations of a Laboratory, while their occupations are varied and even rendered an amusement, without detracting from their utility.

19. Young Officers and Recruits, should next be taught the means of overcoming all the difficulties of moving Cannon on a March, or elsewhere, by shewing the mode of repairing the breakages which may be expected commonly to happen, and remedying accidents of the most frequent

occurence. They should be taught the precautions necessary in passing ascents and descents, in crossing ditches, and rugged or swampy ground; they should be practiced in righting guns which may be overturned, in taking them up and down hills, and difficult ascents, in putting them into boats, and even embarking them in Ships, as well as re-landing them; in shifting their carriages when broken by shot or other accidents, in mounting and dismounting them, both with and without the assistance of Gins; and in fact in extricating them from any difficulty which can be supposed, by placing them as far as possible in the same predicament, and performing the necessary operations. In this department the Board feel assured, that the talent. judgment, and experience of the Director, must be depended on, and will be more useful in the details, than any instructions that could be laid down for them.

20. The proper instruction of an Artillery Soldier, might very well terminate with this stage; but the Board think with reference to the Officers and men being frequently called upon, the former to perform and both to assist in Engineer duties, that some instruction in these cannot be considered irrelevent to the end proposed; all young Officers and Recruits therefore, they think,should be taught how to make Fascines and Gabions; how to construct batteries of both, as well as the tracing them on the ground, and this more particularly during the night; and they should be accustomed to use the pickaxe and shovel, and work in trenches by night as well as by day, with the ordinary precautions, to screen themselves, but without hurry or confusion. Besides this, all Officers, and as many of the men as are qualified, from being able to read and write, may be taught to take plans, and sections of Batteries and Field Works, or Buildings; and to give outline sketches of Guns and Carriages from actual measurements, at least with sufficient precision to admit of fair copies being made by professional Draftsmen; this may in fact be considered a part of their own proper duty, which they may be called on to perform, when places or Guns are captured, as well as making them useful otherwise. As a certain knowledge of practical geometry, will facilitate this kind of instruction, it may be taught after the system laid down for the Chatham institution by Colonel Paisley. It is impossible to define the extent to which this instruction may be carried, it must depend upon the ability, and previous information of the individuals; but in general, it will obvious-

ly be beneficial, to the state that it should be carried as far as practicable. It would be the duty of the instructor therefore, to use all the means in his power, to encourage those who he observes to have an inclination to prosecute such studies, and it would forward this object, if the acquirements when attained, were considered such as to deserve the attention of the higher authorities.

21. Hence, there should be a model room of considerable extent, attached to the institution, where models of all Guns, Carriages, and machines, that either have been, or are now in general use, should as far as practicable be collected and arranged; and models of all improvements or suggestions made for improvement, should in like manner be deposited there; these should be accompanied by memoirs pointing out the reasons why preference has been given to any particular plan, or why others may have been rejected; and the Director himself should be ready to explain any defects supposed to exit. Plans with like memoirs regarding them, may be substituted where models would be inconvenient, and memoirs of all Artillery proceedings, at Sieges and on other occasions, when anything particular in the service may occur, should be solicited from those now able to furnish them for the past; and required for the future, from every Commanding Artillery Officer, to be duly recorded in the department; thus, this Establishment would be a record of the progress of improvement in the Artillery service, where every Officer, of the Corps, desirous of giving attention to this subject, might obtain information regarding what his predecessors had accomplished, avoid their errors, or perfect their projects, without the risk of bringing forward what might long ago have been rejected as useless.

22. But in order to derive the full advantages from this Establishment, a hall should be attached to the model room, furnished with the necessary means of admitting of copies, being made from drawings and memoirs, by those who are disposed to do so; and where the models, plans, and explanations, could be studied without removing them from the institution; this should be open to all Officers at all times, under such regulations as may be found necessary to prevent confusion, and as it would not be necessary, that the superintendent should be always present here, he should arrange, that those Officers who wished explanation or information from him on any subject, might readily obtain it.

23. Access to the models, plans, &c. might even be granted to Non-Commissioned Officers, and such of the privates as had obtained distinctive marks for sobriety and good conduct, under the proviso, that they were not to make copies of anything without the consent of the Director; the hour of their attendance might be fixed separate from that of the Officers, and the superintendent himself, or some of his assistants, should then always be present, and assist them with verbal explanations when necessary. It appears however to the Board to be of more importance, to afford the steady men of the Corps, facility in acquiring practical, and mechanical knowledge and habits, for which purpose, tools, benches, forges, and other means of doing so, should be provided in proper sheds and workshops, to be attached to the institution: such men might after having finished their professional course in the Depôt, be permitted to practice in these shops or sheds, those mechanical employments, to which they have a preference; and if the best workmen are allowed to direct the work, taking others as their assistants, they might be employed in Government work as far as possible, receiving in addition to their Military pay, the same allowances, as would have been paid to the native workmen. When there is no Government employment, they might be permitted to work on their own account, in this case, supplying themselves with all materials, but receiving the use of Government tools, the whole being carried on under the supervision of the Director, and assistants in the model Establishment, by which they would become acquainted with the qualifications of the individuals. By these means, the good men would find opportunities of occupying their leisure time, usefully to the public as well as to themselves, and a succession of Artificers would probably be produced, that might render the European mechanics of our several magazines, and public Establishments, competent to perform the duties they are at present by no means equal to. It would also afford a tolerable certainty of supplying useful mechanics in our Troops and Companies so as to be available for all our trains on service, the want of whom is at present a great inconvenience; for, however numerous our train Establishment may be, while they are only hired for the occasion and totally unacquainted with the nature of the work they are required to execute, much that could be done in Parks in the Field, is necessarily left undone until a return to the magazine can be had recourse to.

24. The Board do not think, in conclusion, it would be unworthy of the consideration of Government, to attach a small chemical Laboratory, with Philosophical Apparatus to this institution, to be placed under charge of some of the Medical Staff of the Corps; who might give occasional Lectures, as well as afford information on these subjects, to such Officers as may require it. When the Board reflect on the long discussions which have of late years been carried on regarding Gun-powder, and other questions involving Chemical and Philosophical results, which have been submitted to the Artillery committees of the three Presidencies, they are strongly impressed with the advantage which would be derived from the Officers of Artillery having the means of acquiring such knowledge to some extent themselves, and having access to the advice of a practical operator, who could explain and satisfy their opinions. At present, such instruction hardly enters into the peculiar education of the Artillery Cadet, the Lectures which are given at Addiscombe, being of a more general nature as well as limited in extent; and the pursuit of such studies in India is impracticable, from the difficulty and expense of procuring the means at the individual's charge.

25. To keep up the practice of Laboratory duties among the Artillery men, the Board think, that as now understood to be the order for the Bengal Presidency, all the Laboratory work required in magazines, and for practice, should be prepared by them; and that convenient buildings should be appropriated for this purpose, either in the magazine or Artillery lines; when the latter are too remote from the magazine, the buildings should be in the lines, and the stores sent to the Artillery men; in which case, a magazine or Laboratory Serjeant should be appointed. These observations embrace every point which appears to the Board to be necessary in the instruction of the Artillery Officers and Soldiers, and to promote an interest in their profession; but if duly considered, it will be obvious that some order will be required in the business of instruction, to prevent its being protracted to an inconvenient length of time. It appears to them necessary therefore, to point out those means which they think may be adopted, with a view of reducing the duration of instruction. Instead of waiting the annual supply of Recruits, before completing the Horse Artillery, the Board think with reference to the somewhat longer time that may be necessary for their instruction than the foot Artillerymen, that this arm, might be completed by degrees as casualties arise, by occasional

drafts from the Recruits of the foot Artillery. The initiatory training of both, in marching and gun exercise being alike, so much time will be saved in the progress of the Horse Artillery drills, and this need cause no confusion, provided the Recruits are not finally posted to Troops or Companies, and therefore will remain at the same station until they have finished their instruction in the Depôt. There are again, many duties of both the Horse and foot Artillery Recruits, which *may* be carried on under cover, such as instruction in horsemanship, in gun drill, in sword and small arm exercise; others again *must* be performed in the open air, as nearly all the first instruction of a Recruit, and the greater portion of the last stage of Depôt instruction; but as there are only a few hours in a morning and evening, during which the Recruit can be exposed in the open air in this country, these hours must be reserved for the latter description of instruction; but the former might nevertheless be conducted simultaneously, and the time of course be thereby considerably diminished by providing proper cover for their being carried on in the middle of the day. If the time is protracted beyond one year, in which a Recruit shall be capable of joining his Troop or Company, either more men must be added beyond what the Board has fixed, to admit of the absence of the increased proportion of Recruits, or they must be sent to join imperfectly trained, and the object of the institution of a Depôt be defeated; and the Board therefore, do not think that the expense of providing the buildings required is an object, when compared with what is to be gained from them. They therefore recommend, that a good Riding School be erected at each Presidency, and that the Gun sheds be constructed on a scale to admit of the Guns being drawn out and unlimbered, with space between them for drill. When limbered up, they will then give room in front for the other objects contemplated. These with the necessary buildings in the model department before suggested, and a Laboratory proportioned to the number of men to be engaged in it, will, the Board think, enable the proper authorities to complete the course of instruction in about a year. Having thus detailed the object of the Depôt of instruction, the Board are prepared to proceed to the formation of its Establishment; but with reference to the suggestion of Government, that this may be done without expense in Bengal and in Bombay, the Board think it necessary to make a few observations.

26. At Dum-Dum, and St. Thomas's Mount, there is a Magazine intended solely for the supply of stores at the

Head Quarters of the Artillery Corps, but at Ahmednugger where the greater body of the Bombay Artillery is stationed, the magazine is the principle one of a division; it is considered therefore, that some modification of the arrangements for conducting the ordnance duties, conjointly with those of the Depôt of instruction, will be necessary, but this they suggest may be left to the Bombay Government. The Board can perceive no objection at Dum-Dum, to adopt the same principle as at Madras, of connecting the magazine with the Depôt of instruction, but the Board considers, that this institution at all the three Presidencies must be essentially of a Military character; and this is not now the case with their magazines, which by the orders of the Supreme Government belong to the Civil Department of the Army. The Depôt must be framed entirely with reference to the duty of instructing recruits and Officers; the duty of the magazine as far as it is connected with the Artillery Stores at Head Quarters, may indeed also be assigned to the Director of the Depôt; but this duty must be considered incidental and not primary. The instructors should not, the Board think, be charged with work not strictly belonging to the magazine (as here defined) and the Depôt of instruction. In this respect the Board find, the object of the magazines, has been entirely subverted in Bengal, and its duties have been gradually increased, until it is overburdened with work; and more especially since the removal of the Gun Carriage Agency, the manufacture and re-making of carriages, has become an essential part of them. The model department, also, instead of being appropriated to its original purpose, has been converted into a manufactory. But it is quite impossible that this can be continued, when the magazine shall be converted into a Depôt of instruction, and the Board are not prepared to decide in what manner the duties above detailed can be provided for without expense.

27. With a view to the Military character of the Depôt, and to the objects of the institution, it is indispensable that the Superintendent should be selected for his qualifications as an instructor and for his practical knowledge as an Artillerist, and that he should have Military authority. He should not therefore be one of the regular Commissaries of Ordnance, who though otherwise unobjectionable in their line, may still not possess the qualifications required, and who cannot by the rules of the service exercise Military Command. This must be more strongly insisted on, where, as

in Bengal, Officers may be appointed to the Ordnance Department before they have acquired any practical experience; and rise by rotation in it without the possibility of acquiring such experience beyond the walls of a magazine. However well this system may answer for providing good Commissaries and Store keepers, it by no means insures that those who have attained any standing, shall be qualified as Depôt instructors, and as it is necessary that the Superintendent of the Depôt, should be an Officer of some standing, he must therefore be appointed for qualifications distinct from those deemed requisite for the Ordnance Department.

28. The same reasons must regulate the appointment of the Assistant, for although he is a Warrant Officer, he must exercise authority next to the Commissioned Officers, and he cannot therefore, be a Conductor of Ordnance in the regular list, who can exercise no Military authority; a large proportion too of the Conductors being appointed from the Cavalry and Infantry, have had no opportunity of obtaining experience in Ordnance matters or as practical Artillerists; and as they are appointed at an age when they cannot themselves be very apt to learn, they cannot be expected to become good instructors of others, or even to be really useful in the Ordnance Department. The Board therefore recommend, that the Assistant to the instructor, should be appointed from the Non-Commissioned Staff of the Depôt itself, on the recommendation of the Commandant of Artillery to the Commander in Chief, and as in this manner he would sacrifice all further advancement, the Board would propose to put him at once on the footing, as to pay and pension, of a Deputy Assistant Commissary of Ordnance. All the Non-Commissioned Staff, should be appointed by the Commandant, by selection from the Regiment generally.

29. The Board are convinced that the Director of the Depôt, on the extended scale they have suggested, could not at either Presidency perform the duties now required at Madras. In addition to the superintendence of the instruction, above detailed, the Board see no objection to his being the Secretary to the Select Committee, and even being a member if requisite, but they are of opinion, that he cannot undertake the general control of all the Field trains in the service, and afford any extensive assistance to the Commandant in the Ordnance Department. He will of course be able to keep the record of the Practice, but the Board are of opinion, that all experiments of a general nature, and all

practical questions should be carried on by the Select Committee of each Presidency, whose proceedings should be laid before Government. As no Select Committee has been established at Bombay, the Board recommend the early formation of one on the principle fixed by the Supreme Government, and that it should be established where the service of experienced Officers of the Horse Artillery and the Director of the Depôt, may be available; as they are of opinion, that whenever available, one Officer of Horse Artillery, at least, should be a member at each Presidency. The Board are well satisfied, that the better care of, and attention to our Field trains, requires, and that uniformity of system likewise demands, a change in the arrangements for the general control of all the Field Trains; to adapt them to the circumstances of the three Presidencies, in each of which they are managed differently, and could not therefore very well be directed in concert with one another; but this the Board think would be provided for by the appointment of a Director of Ordnance. With these observations, the Board submit in the appendix, a table (marked C) shewing the scale for a Depôt at each Presidency.

30. When we consider the number of machines and implements, which are necessary for the service of any number of Guns, it will be obvious that efficiency and economy in equipment, will be obtained in proportion as they are simplified; and this result must depend upon arrangements which can only be expected from an intimate acquaintance with their use; that such only may be provided as shall be proved to be proper and requisite, under an energetic and vigilant control. We should surely be most likely to find this in the Corps expressly devoted to their service, and we should therefore, we conceive, look upon the Ordnance and their accompanying machines and implements, only as the arms of the Artillery; and should be careful never to loose sight of the connection which thus exists between them; but from the bulk of the Cannon themselves, the different natures applicable to different purposes, and the number of carriages which are required to accompany them in the field, it has been necessary to form separate Depôts or magazines for Ordnance equipments, and the details of regulating these Depôts are so intricate, as to require the especial attention of an Officer to conduct them. These magazines having also been placed under the control of the Military Board, have come to be considered quite distinct from the Artillery;

and the Officers of that Corps have in consequence, no knowledge either of the number, the nature, or the condition, of the arms they are to use, until they are required to employ them on service. The Commissaries of Ordnance in charge of the magazines, being however always selected from the Artillery, insures so far, professional assistance to the Board in regulating the details of each; but with our extended chain of magazines, some controlling power is required to preserve uniformity in their arrangements, and to keep up proper co-operation between them.

31. The Military Board is not calculated from its formation to supply this power, composed of members, none of whom are practical Artillerists, but the Commandant of Artillery; it is not reasonable to suppose that they should be capable of directing such details without trusting entirely to the Commandant's judgment, and in point of fact, therefore, the efficiency of the Board, as relates to the Ordnance, depends on the ability of that Officer alone for the performance of this duty. But if we consider that the Commandant of Artillery, has besides, important functions to perform, in regulating the details and discipline of a large body of men; functions which in other branches of the service are considered sufficient employment for one Commanding Officer, and which are still more arduous in the Artillery, we shall readily conclude, that he can have little time to devote to the consideration of the additional details, of so complicated and extensive a department as the Ordnance. Instead then of directing the Board, he himself naturally looks for assistance from the other members, and more especially from the Secretary, and as that Officer (no more than the members,) possesses the practical experience which is necessary to regulate the details of so important a department, this duty is in consequence very imperfectly performed. The attention of the Commandant, and consequently of the Board itself, can seldom extend beyond the leading points of the system, and the details are too frequently left to the Commissaries themselves, who each acting independently act differently, and naturally produce the very confusion and want of uniformity it should be our object to prevent.

32. Even then, if we suppose our Ordnance equipments to have arrived at that state of perfection, to be regulated on fixed principles, the present system affords no check on the introduction of irregularities. But this is not the

state of affairs that has hitherto existed, or that we must contemplate for the future, for the Ordnance equipments of no country in the world, have as yet obtained that degree of perfection, which places them beyond the hope of improvement, and which cannot be made without changes; in India, this department has been in a constant state of progression, involving changes in such rapid succession, as to have produced of late years more than ordinary confusion. These changes are the result, no doubt, of the greatly increased care of Government to improve the efficiency of the service; and the direction of the Ordnance consequently requires, not only extensive practical experience, which we have seen has never been sufficiently provided for, but also considerable theoretic and scientific knowledge; which under existing arrangements, we have no better chance of obtaining. Scientific acquirements are not cultivated by every member of a professional body, most of whom will ever be contented with practical knowledge only, and they cannot therefore be expected solely from length of service. But as the Commandant of Artillery obtains his position by seniority, length of service and the consequent practical experience, is all we have certainly to calculate on from him, scientific acquirements are not unfrequently wanting in his person, and when this is the case his influence in the Board, and with Government, cannot have that weight regarding subjects that come before him, which would guide them in their determinations. The regulation of the Ordnance Department, is thus thrown almost entirely in the hands of unprofessional men, and though a stimulus may from time to time be given, by the intelligence and activity of an individual Commandant; this has been so much a matter of chance, that in the general result, the interests of the Department have most frequently only received attention, as its defects forced themselves into prominent notice.

33. We need only trace the past history of the service in Bengal, to bring proof of this. Previous to 1788, no Siege Ordnance was allowed with the Field Army* and although two 18 Pounders were added in the year 1788 † no shell pieces were given until 10 years afterwards, when two small Mortars were added. ‡ No addition appears to have been

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* See G. O. May 1770 when 2—12 Pdrs Brass, 8—6 Pdrs Brass, & 3½ inch Howitzers, were fixed as the train for the field army.

† M. C. 18th August 1788.

‡ G. O. 5th February 1798.

made to this Establishment until 1801, when the late Sir J. Horsford represented that the siege of Mud Forts having become a constant occupation of the Field Army, a train of at least eight, 18 Pounders, were required.* These eight Guns, with three or four Mortars, were all the Ordnance available to form the Siege Train with the grand army under Lord Lake in 1803; and we know the consequences of this deficiency both at Deig and Bhurtpore when besieged by that Army. But this was not the only evil attending this miserable improvidence in Siege equipments, for in proportion as our authority was spread over an extensive and unsettled country, in which every Zemindar, was ready to fly to his Mud Fort; the necessity for reducing these strong holds became more frequent, and the want of proper Siege equipments introduced a practice of attacking them by assault, with the aid of Battalion Guns only. The repeated failures in such attempts, not only brought the greatest discredit on our arms, and promoted the disposition to resistance, but even where success was attained, it was attended with a loss of life so disproportionate to the object, that Government were at last compelled to prohibit such attacks, unless when assisted by a due proportion of Battering Cannon, Mortars, and Howitzers.† Thus the attention of the Ordnance authorities was first drawn to the proper equipment of the Army, so late only as 1806, and so little had they contemplated such calls, that the means of compliance on the scale required, were not available for some years afterwards. To a deficiency of these means we may again attribute our misfortunes at Kumohu in 1807-8; and in fact, the result of the siege of Hatras in 1817, with that of the last siege of Bhurtpore in 1826, may be said to be the first fruits of the better system of equipment. But that these equipments were not more efficient than they were adequate in numbers, we may conclude from a report from Sir J. Horsford to the Military Board in 1808, who when called on to inspect a particular Carriage, says, "In this "service no established dimensions are fixed for any piece "of Ordnance, but the Arsenal is crowded with Carriages "of all shapes and dimensions" therefore he adds, "I am "totally at a loss to know what is meant, all these Carriages "are called present Carriages." This state of confusion indeed, was not unknown to the Military Board itself long previous to this notice of it by Sir J. Horsford,* but instead of adopting measures for a reform, they only prescribed it as a standing order to Artillery Officers, that when anything about a gun was condemned, the indents should include Guns, Carriages, and Equipments, complete; lest they might not fit if sent out separately; and on this footing, the Ordnance Department remained until 1820, when it was at last taken up by Government; several papers on the subject were then submitted to the Board, when this body fairly acknowledged their own incompetency to regulate such matters, by reporting that, "The papers involve questions purely professional, in the decision of which the members do not pretend to a sufficient degree of knowledge individually, to authorize them to offer opinions."

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* Sir J. Horsford's Memoir on the Artillery Establishment delivered to Lord Lake in 1801.

† G. O. 8th November 1806.

34. This deficiency in the Military Board, led Government to form the select Committee of Artillery Officers, to investigate professional subjects, submitted to them by that body: but it was soon found that this by no means facilitated the determination of any matter under consideration. None of the members of the Committee are selected as scientific men, they are all either Staff Officers Superintending other important departments, or appointed by a routine, owing to which, they are continually liable to be changed; some consequently had no time to enter deeply into the consideration of the matters proposed to them, more especially, when involving theoretic or scientific considerations; others again, were changed in the middle of an investigation, by which the chain of the argument, was broken and misunderstood. Unprofitable discussion therefore, frequently was concluded by a want of unanimity, and the case was returned to the Military Board more embarrassed than before, by the difference of opinions in the professional Committee. There was then, no professional authority who could weigh facts, and balance the opinions produced on the subject; and if decisions where given either by the Board or Government, they were of course divested of that weight, which would carry conviction to the minds of the members. The determination arrived at under these circumstances, were hardly ever considered final by those members of the Committee who differed from them, and who consequently availed themselves of the first favorable opportunity of reviving the

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* Resolution Military Board 18th January 1793. Requires the dimensions of all Ordnance to be specified (in indents,) to insure their fitting.

subject, creating thereby instabillity in all the results arrived at. There is in fact the want of a directing mind, who might not only be of use in advising the select Committee itself in its deliberations, but in assisting the Supreme Authorities to decide upon fixed principles, from the experiments and arguments elicited in their proceedings, and who in event of difference of opinion in that body, might assist the Military Board or Government in the decision of the point, by offering a summary, founded on careful professional investigation.

35. Though the elucidation of this subject has been drawn from the past experience of the Bengal Presidency, similar inconveniences have been felt at Madras, and Bombay, and we accordingly find endeavours to remedy them at all the three Presidencies, differing from each other only with reference to the circumstances of their Establishment. In Bengal, from the extent of duty in directing the largest Corps of Artillery, it has been evident that the Commandant of that Presidency, could allot but an inconsiderable portion of his time to the Ordnance details, and the remedy has been attempted by a reform in the Military Board itself, so as to make the remaining members more efficient. But so long as those members are not professional men, they are not likely to be of any assistance to the Commandant; and having besides, the control of so many other important and extensive departments under their supervision, their attention is too much occupied to apply sufficiently, to the more minute and intricate details of the Ordnance Department, which are entirely in their hands. At Madras, the old form of the Military Board is retained, but the powers of the Commandant have been enlarged, which has given greater weight to his opinions in the Board. With an intention of avoiding the inconveniences experienced in Bengal, from conflicting opinions of their select Committee, the proceedings of the Madras select Committee are passed through the Commandant, and in transmitting them to the Board, he offers his judgment according to the energy and interest excited by the nature of the subject before him. The Madras plan, was however originally tried in Bengal, but experience proved the mischief which would arise from a continuance of it, which we think it is still liable to, and led to the different system of making the select Committee independent of the Commandant, and responsible directly to the Military Board and Government. At Bombay, no Military Board exists, and the sole responsibility of the Commandant is sub-

stituted in the Ordnance Department. But we may observe, that the advantages of this as well as of the Madras reform, depends entirely upon the same chance that makes the Commandant an useful member of the Board itself, and we have no doubt, that it is not more likely to be successful, but is liable to be productive of the serious evils heretofore experienced at all the three Presidencies. We indeed find the controlling authorities at all the Presidencies, appeal more than ever to select Committees, even in matters of mere detail, thus demonstrating in the opinion of the Board their deficiency, and making it of more importance to give weight and stability, to the decisions of the select Committees themselves.

36. The true solution of this difficulty will be found we believe, in considering the two distinct functions to be performed, and assuming that the Commandant will always by his standing in the service, possess the experience necessary to direct the Corps of Artillery, and generally to advise in its equipment, we would supply the theoretical and scientific knowledge required in regulating the Ordnance Department, by selecting an Officer of known qualifications expressly for this purpose. To give due weight to his opinions, it is of course also desirable, that experience should not be altogether wanting; and that consequently the Officer should have attained that rank where it is most likely to be found. This would in fact be nothing more than extending to the Ordnance Department, the same principle as has been found necessary in the others subject to the Military Board. In the Barrack department for instance, there are Superintendents of Buildings; in the department of supply, there are the Commissary, and Deputy Commissary General, who in reality direct the subordinate details of these departments, subject to the general control and superintendence of the Board; and supposing a similar duty to devolve in the Ordnance Department, on the Officer now proposed to be appointed, he may appropriately be denominated the Director of Ordnance. But in suggesting to appoint an Officer to this trust, we by no means propose to substitute his authority for that already existing, which would be little better than shifting the load to different shoulders; we rather propose, that he should become their assistant; and with this view we think his supervision may be divided into three heads, on the following principles.

37. *First.*—The stores of our magazines should be divided into two distinct classes, the first of which, should consist of the Artillery and stores kept in constant readiness

for service, both of our siege trains and Field Artillery, and also mounted on the works of our Garrisons. These may be considered the proper arms of the Artillery Corps, and although retained under charge of the Commissaries, should nevertheless be under the immediate direction of the senior Officer of the Artillery at the Station. In regard to this portion of our equipments, the Director of Ordnance should act in communication with the Commandant of Artillery; and no changes should be proposed in the number, nature, or equipments of these Ordnance, without the previous concurrence of competent authority obtained through him.

Second.—The second class of stores in our magazines, would comprise the Ordnance and stores in excess to the foregoing, together with the reserve arms, ammunition, camp equipage, and other equipments of the Troops of the line. In regard to this class of equipments, the Director of Ordnance should communicate direct, with the Adjutant, or Quarter Master General of the Army, as the case may be, for the information and order of the Commander in Chief; with whom of course it must rest, with reference to his views for the distribution of the Troops, to determine the best position for, and the proportion of the reserve stores of the Army at large.

Third.—In all matters of accompts, and arrangements for supply, or involving expense connected with the Ordnance Department, the Director of Ordnance would communicate with Government through the Military Board, or controlling power of the Ordnance Department, whose more especial duty is to attend to these objects.

38. On these conditions we conceive, the whole detail of magazines and agencies, connected with the Ordnance Department, may be conducted by the Director of Ordnance; and he should become the organ of communication between them and all superior authorities; it would be his duty to supply the Commissaries and Agents, with such approved plans, musters, or models, and detailed written instructions, as would enable them fully to observe uniformity in all their transactions, and they would then be responsible, that in receiving stores no deviations were allowed from established regulations, or without being brought to the notice of the Director.

39. The Director of Ordnance should prepare all Indents for Europe supplies on the home authorities, furnishing with them, such plans, drawings, and explanations, as will ensure a proper description of articles being sent out; and no stores should be received into the Arsenal, of a different description from the pattern established by authority, without be-

ing brought to his notice. In preparing this Indent, the Director of Ordnance should be careful not to include any thing which can be economically supplied in the Country; and it should be his duty to ascertain this in concert with the Commissary General, and the subordinate Officers of the Commissariat, and those of his own department. Having through them ascertained how the country supplies, can be best and most economically provided, he would arrange to have Indents for them sent in at periods, which would admit of due preparation to meet them by the providing Officer.

40. It would be the duty of a Director of Ordnance, to fix in concert with the proper authorities, the stores of each Magazine necessary for the supply of the Troops dependant on them, and to keep these stores complete, without allowing accumulations at advanced stations, which are always creative of expence. When changes take place in the disposition of the Army, it would be his duty to suggest the necessary arrangements in the store Department, pointing out to the Commander in Chief, where those arrangements would be productive of expense, in order that the whole question may be before him in deciding on their propriety. The regulation of Magazine establishments, would be a material object of his attention, and it would be his duty to suggest the arrangements necessary for this purpose, either in allotting new or in changing the old establishments. All removals and posting of Ordnance Officers, would of course be suggested by him, to the Commander in Chief, as he might think necessary. Indents from Corps, and departments, prepared under the existing rules of the respective Presidencies, might be finally checked and deposited in his Office; such only as he may find unsupported by authority being submitted for the approval of Government.

41. These particulars will convey a sufficient idea of the mode in which the Director of Ordnance may be useful in carrying on the duties of our Magazines. The next object is to preserve uniformity and regularity in the equipments; and as nothing can conduce more to this end, than he himself being well informed of the nature of the changes which may take place among them, and the reasons for the changes themselves; we would propose that the Director of Ordnance should be considered the proper Officer to whom every suggestion of this nature is to be made. This should more especially be enjoined on all Officers of the Artillery and Engineers, when they are on service, who should duly acquaint him with all inconveniencies experienced in existing equipments, offering at the same time any suggestions which occur

to them, for removing them. The senior Officer of Artillery at stations, should be also enjoined, to have periodical inspections of the Artillery and Stores reserved for service, by drawing out all the Guns and Carriages from the gun sheds, and distributing the side arms and small stores, to their proper piece.

The service proportion of shot and shells should also after being gauged and proved, be piled near each piece, and if practicable, the Guns and Carriages, should make a short move of three or four miles, which may always be done when there are Cattle at the station. This inspection should be conducted as much as practicable by the Artillery Officers, and their men, as well to accustom them to the preparation of the Guns for service, as to ascertain that the trains are all fit to move; and every article of equipment should be carefully inspected, to see that they are of proper patterns and dimensions. The senior Officer of Artillery should make a particular report of this inspection to the Director of Ordnance, pointing out any deviations from established orders which he may discover, and suggesting any alterations or improvements he may think desirable; the latter Officer should communicate these to the Commandant of Artillery, and arrange with him the steps necessary to be taken in consequence. When the stores are all drawn out, it would afford the best time to inspect the reserve stores, and the Magazine store rooms, to which the attention of the senior Officer of Artillery should be particularly directed, in concert with the General, or other Officer in Command, as is now done; and any deviation from patterns or inconvenience in Equipments, which may then be discovered, should be duly made known to the Director of Ordnance; should either increase of room for stores, or increase of stores be recommended, the same should be noticed, as well as the state and condition of the Magazines in general.

42. As these inspections will form an important part of the duty of the senior Officer of Artillery, quite distinct from what is usually required from him, the Board recommend an extension of the rules regarding command money, (as already recognized in all the other branches of the Army; and in the Artillery at Madras, and Bombay,) to the command allowance of Artillery Divisions, in the three Presidencies Generally; so that the Officer succeeding to temporary command of an Artillery Division, should receive that allowance without reference to rank during the time he exercises that command; for it will be obvious that he must perform all the duties in the absence of a Field Officer.

43. To render these inspections efficient the greatest attention should be paid to the school of instruction at Head Quarters of the Artillery. The Director of Ordnance should be especially charged with frequent personal inspections of the magazines or store rooms of this school, to see that no carriages or other implements are in use, but such as are of the most approved pattern; and that the instructors teach the use of the several machines &c. &c. in the proper and most approved mode. By these means, the whole of the Officers and men, would be rendered fully conversant with what is right, and competent to detect deviations at their inspections. Every Warrant Officer on first appointment, should be required to attend the Depôt of instruction, and only be allowed to proceed to his duty, when the Director of Ordnance shall have satisfied himself of his being fully informed on all points.

44. Thus it appears to us, that the general preservation of uniformity in our Ordnance equipments would be ensured, and all defects would be brought to the notice of the Director by the reports which would from time to time be received. It would be his duty then, to consider all these reports carefully and deliberately, and to determine what alterations it may be proper to suggest in consequence. In doing this he should bear in mind, that it is always desireable to avoid frequent changes even when useful, with which view those which can be easily adopted may be immediately proposed; but those which may require any extensive alterations, should be adopted only at convenient times and opportunities, unless when of a nature which renders their introduction paramount to all other considerations. This we consider the most important duty for the interests of the state, and of the Ordnance department; for it will be obvious we think, that the qualifications for which the Director is to be selected, the information which he must obtain in the course of the duty which we have proposed for him, and the deliberation he will have to bestow on all proposals for changes, ought to insure the best security against crude and useless proposals being entertained; and if we add to this, a further practical examination of all his recommendations, we shall subject the alteration of our ordnance equipments to such scrutiny, as could hardly fail to prevent the adoption of any but real improvements.

45. In order then that this further consideration may be given to the subject, the Director of Ordnance having duly considered the proposition made to him, from any quarter, should communicate the same to the Commandant of Ar-

tillery with his opinion on them; and if they concur in thinking them likely to be useful, they should be submitted by the Director to the Select Committee of Artillery Officers for their report. In communicating to them, the Director will also submit any observations he thinks worthy of their attention, and point out any experiments he thinks likely to establish the merits of the question; and the Committee should be obliged to attend to these instructions, adding any other experiments which they may themselves think further to be necessary. In the course of their deliberations, the Committee should be at liberty to consult with the Director of Ordnance on any matter of importance, in which they think his opinion may be useful; and the Director should be at liberty to advise the Committee in reply, either in writing or by attending a Meeting, as the nature of the subject may require; but the Director should not we conceive, enter into discussion with the Committee in the course of the proceedings, it being of much importance in our opinion, that his judgment should remain unbiassed by the collision of argument until the proceedings are closed. The Director should at all times be informed by the Committee, both of the time when, and the nature of experiments to be carried on, and have the option of attending them, and of directing when he thinks necessary those proposed by himself. It will be evident then, that the Director should not be a member of the Committee.

46. This Committee the Board think, is now well constituted as to the number of members in Bengal, but instead of the two Senior Regimental Officers at the station where it meets, next to the Commandant, we would propose the Senior Officer of Horse, and of Foot Artillery; and instead of the Deputy Principal Commissary of Ordnance, we would propose the Director of the school of instruction, and the Committees of the three Presidencies may be formed on the same principles; the duties of Secretary being performed by the Director of the school of instruction, with the same allowance and office establishment, as is now granted in Bengal.

47. When their deliberations are concluded, they should forward their proceedings to the Commandant, through the Director of Ordnance, for the information of the Board and Government; and it would be the duty of the Director, to make such observations as may suggest themselves to him, from what has been recorded by the Committee. In cases of difference of opinion between the members of the Committe itself, or when he may differ in opinion with the united voices of the

Committee, this duty would be of the greatest importance, and in fact we would consider the Director from his better opportunities of being acquainted with the details, to be the adviser, who as we have before suggested, is to point out the general bearings, of the question to the higher authorities. The Commandant in receiving the report thus elucidated, will then decide what points are to be submitted to Government through the Military Board; as an exception to this rule however, it might be proper that if any point is submitted from the Adjutant General by order of the Commander in Chief, or by the Military Board itself, the Director would forward the proceedings direct to those authorities.

48. It should however be required from the Director, to make a periodical report through the Commandant of Artillery to Government; shewing in abstract, the several proposals received by him, the tenor of each proposal, and the manner in which it was disposed of. This report will shew Government those Officers who take most interest in their profession, and who contribute most to its improvement; and it will be satisfactory to the Officers themselves, to know that their endeavours are not altogether neglected even when unsuccessful. Most of the information which Officers have it in their power to communicate we believe to be now lost; from want of an authorized channel by which it may be conveyed, and from want of confidence in its being properly attended to. These reports would afford a certainty of both objects, and would form a register of suggestions, in which Officers might obtain information as to what has been already done, and only take up questions already decided, where they have improved views regarding them to offer. It should be always understood, that the proceedings which have before taken place on any subject, should always be open to the inspection of any Officer requiring information, on obtaining the consent of the Director; and that the Director should assist such Officers with his advice and opinion on professional points when required.

All Commanding Officers of Corps, stations, and all Officers in charge of Departments, should therefore be allowed to frank letters to the Director of Ordnance which are of this description.

49. The Directors of Ordnance at the three Presidencies, should be also placed in Communication with each other; and whenever it is deemed necessary to propose any alterations or improvements in Ordnance equipments at any one Presidency, the same question should be submitted by the

Director where it originated, to the Directors of the other Presidencies, for the opinion of the select Committee there.

Copies of their decision should be communicated to the Director of the Presidency who submitted the question; and if two of the three agree, the point may then be submitted through the Local Government to the Supreme Government; but if two reject it, the question should be abandoned without reference.

50. The Board are of opinion, that in this manner all unnecessary trouble and expence would be saved to the state, and public authorities; while every necessary object to the efficiency of the service, would be secured, and uniformity would be preserved and promoted, with the best chance of being strictly applicable to all the Presidencies; for the Board consider, that the mere uniformity of construction of our carriages would be immaterial, unless it is extended to every equipment; and unless uniformity of proof of Powder and Ordnance; of reports and returns, in the Ordnance Department; and in the nomenclature used in the Magazines, be established and kept up throughout all India On these subjects therefore the Directors of Ordnance should be enjoined the most constant, and free communication with each other.

51. The Board cannot conclude what may perhaps be considered too lengthened a report, without urging as their apology, the immense importance of the subject they have had to consider, according to their opinions of it, and that some idea may be formed, how far this opinion is warranted and just, they beg to annex in the appendix (Marked E) an account of the institution sanctioned by the Government of France for a similar purpose in the Artillery service in that country. The Board are far from entertaining the expectation that the same course is necessary to be observed by the Indian Government, as much which is included in the annexed memoir, is already provided for in England; but they especially beg attention to the following points which they think applicable to the Indian Artillery, under circumstances which differ essentially from those of the Royal Service.

52. The French Artillery like the Indian, is divided into distinct Corps, for which it is necessary to preserve uniformity of discipline and equipment, while the Royal Artillery is composed altogether of one Corps; and to effect this object, the French Government have a central board of Artillery Officers, to whom all subjects of general interest are submitted for approval. A Board composed of Officers of

the three Presidencies in communication with the Supreme Government, appears most analogous to this.

53. We have endeavoured to provide for the same, by proposing a co-operation between the Select Committees and Directors of the several Presidencies; but it will be evident that while the examples of the French confirms the justness of our views on this subject, the means they have adopted are much more simple, and better calculated for the transaction of business, though we have not considered ourselves justified in suggesting so great a deviation from the established system,—we nevertheless recommend it to the consideration of Government.

54. We have confined our suggestions to those which were in our judgment, calculated to promote the voluntary co-operation of individuals, in promoting the interests of the service. How far it would be an improvement, to establish rewards, for the solution of intricate and important questions publicly proposed to the service, may be matter worthy of further consideration; but we can have no doubt that the due publication of properly drawn up abstracts, from the proceedings of the Select Committees (at least in all matters deemed by them of sufficient importance, and of a nature to be made public), would materially improve the disposition to consider these subjects. The Board much fear, that whenever, or by whatever means, the details regarding the improvements of Artillery are discussed and decided, unless they are made public, it would be considered the duty of the few, in which the many have little or no concern; whereas the Board think, that the interest of all should be set in motion, and that the duty of Committees and Directors, should be to collect and methodise what is the result of the general labor. This result should be made known, not only as affording a check upon the decisions of the Committees and Directors themselves, but to satisfy the body of the service, regarding the objects and intentions of the controling authority; and to keep their views directed steadily to the same object.

55. If a Central Board were established, this compilation might properly be conducted under their Superintendence; and the opportunity might be taken, of stating questions which required to be considered by the Armies at large. If the Board is not thought necessary, some other plan may be devised of drawing up a general report in Calcutta, of the proceedings of the three Presidencies, from those in possession of the Director of Ordnance in Bengal, and those which would be furnished to him by the Directors of

Ordnance at the other Presidencies, or the system suggested by the Board.

(Signed) J. STEVENSON, Lt. Col.
Bombay H. A. President.
„ J. TENNANT, Lt. Col.
Bengal Artillery.
„ C. GRAHAM, Lt. Col.
Bengal H. Artillery,
„ R. S. SETON, Captain,
Madras Horse Artillery.
„ W. T. WHITLIE, Bt. Capt.
Bombay Horse Artillery.

A.

STATEMENT *of Casualties in the Corps of Bengal Artillery.*

1st Period of 10 Years.	Horse.	Foot.
Recruits received from the 1st January 1814 to the 1st January 1824	526	2931
Strength of the Corps on the { 1st January 1814	331	1787
Strength of the Corps on the { 1st January 1824	443	2204
Increased strength ...	112	417
Casualties during this period, being derived from the difference between the recruits received and the increase of the Corps.	414	2514
Average strength of the Corps	387	1995
Annual casualties, per cent on average strength...	10¾	12½
2d Period of 10 Years.		
Recruits received from the 1st January 1825 to the 1st January 1835..........................	1363	2430
Strength of the Corps on the { 1st January 1825	448	2511
Strength of the Corps on the { 1st January 1835	1025	2248
Corps { Increased by	577	0
Corps { Decreased by ...	0	263
Casualties being the sum of the recruits received and diminished strength; and the difference of the recruits received and the increased strength....	786	2693
Average strength of the Corps................	737	2380
Annual casualties per cent. on average strength......	10¾	11¼

B.

Probable Annual Supply of Recruits required.

	Bengal.		Madras.		Bombay.	
Troops of Horse Artillery 130 men each with 10 for recruits........	9	1260	4	560	4	560
Brigade Staff....	3	27	1	9	1	9
Strength of the Horse Artillery.......	0	1287	0	569	0	569
Casualties annually at 10¾ per cent....	0	139	0	61	0	61
Companies of Foot Artillery 103 men each.........	20	2060	12	1236	8	824
Battalion Staff......................	7	56	4	32	3	24
Strength of Foot Artillery......	0	2116	0	1268	0	848
Casualties annually at 12 per cent......	0	254	0	152	0	102
Total supply of Recruits annually.....	0	393	0	213	0	163

C.

PROPOSED *Establishment of a Depôt of Instruction, for Artillery Recruits, at each of the Presidencies of Bengal, Madras and Bombay.*

	Bengal.	Madras.	Bombay.	Monthly staff pay of each Comps. Rups.	REMARKS.
Director and Laboratory Master...	1	1	1	600	Not to be under the rank of Captain, and no restriction of rank on vacating, to have the full field allowance, of his rank, in addition to salary.
Assistant Director and Laboratory Master....	1	1	1	......	Assistant Director to have rank next to all Commissioned Officers; and to have the pay, allowances, and Pension, of a Deputy Assistant Commissary of Ordnance.

Proposed Establishment of a Depôt, &c. &c.

continued.

		Bengal.	Madras.	Bombay.	Monthly Staff pay of each Company's Rupees.	Remarks.
Serjts.	Modeller and Mechanic	1	1	1	60 With the Regimental Pay and Batta of their respective Ranks.	
	Draftsman	1	1	1	60	
	Instructor	4	2	2	20	
Corpls.	Asst. Modeller	1	0	0	30	
	,, Draftsman.	1	1	1	30	
	,, Instructor.	4	2	2	15	Also acts as Lithographer.
Gunners or Bombardiers Laboratory men		6	4	4	10	
Lascars.	Soobadars	1	0	0	0	
	Jemadars.	1	1	0	0	
	Havildars	3	1	1	0	
	Naicks	3	2	1	0	
	Privates	60	40	25	0	
Engravers.		1	1	1	0	Note. In Bengal, if the charge of the Guns on the Ramparts of Fort William are continued, as they may be, with the Commandant of Artillery and the Director of the Depôt, one Sub-Conductor and ten Magazine Men, will be required to look after them, and to take care of the Store rooms in Garrison, in addition to what is here proposed.
Carpenters.	Maistry	1	1	1	According to the rates at present given at the Presidencies respectively.	
	Workmen	12	4	3		
Blacksmiths.	Maistry	1	1	1		
	Forgescomplete	6	4	3		
Braziers or Tinsmiths.	Maistry	1	0	0		
	Workmen.	6	2	2		
Painters.	Maistry	1	0	0		
	Workmen.	5	2	1		
Bildars.	Sirdars.	1	0	0		
	Bildars.	7	0	0		
Sail makers.	Maistry.	1	0	0		
	Workmen.	2	2	2		
Sawyers.	Maistry	1	0	0		
	Workmen.	4	2	2		
Turners		2	1	1		
Coopers		2	1	1		
Puckallies		1	1	1		
Hand Bheesties		2	1	1		
Sweepers		1	1	1		
Sickledars or Armourers.	Maistry.	1	1	1		
	Workmen	7	2	2		
Establishment of Clerks.		240	150	150	Rs.	
Allowance for Stationary		115	100	100		

D.

Bengal Minute.

Government having desired our attention to the expense of our plan for instruction at Bengal, and Bombay, the Bengal members think it necessary to submit the detail of its operation, to shew that in point of fact it would be inconsiderable, compared with the importance of the object.

The arrangements in Bengal, may, the members of that Presidency think, be conducted in the following manner.

1st. As there is but one Company of Artillery at Nusseerabad, there cannot be a necessity for a Field Officer to Command the Artillery at that station, much less for a Battalion Head Quarters and all its Staff. It is therefore proposed, that the Head Quarters of the Battalion be removed to Kurnaul, where there are now two Companies of it, with an extra Adjutant and the usual Non-Commissioned Staff, these of course would cease to be allowed.

2d. As the Commanding Officer of the Battalion above proposed to be removed to Kurnaul, would also exercise the Command of that Division, the services of the Commanding Officer of the Horse Artillery Brigade cannot be required there, as there is only one Troop of the Brigade at the station. The Head Quarters of that Brigade may consequently be removed to Dum Dum where it would form the Horse Artillery Drill Brigade.

3d. To assist the Riding Master of this Brigade, one Rough rider from each of the European Troops should be ordered to join it. This would give with the two Rough riders of the Troop at Dum Dum, ten rough riders for the general duties of the School, and we are not of opinion that any further diminution of the riding establishment of the Head Quarters of the detached Brigades could be made, owing to the constant duties which occur there with young horses, native recruits, and occasional lunges. But the assistance above proposed to the riding Staff of the Brigade at Dum Dum would we think be sufficient.

4th. The Drill Staff must be supplied in like manner; there will be three Drill Serjeants from the three Brigades, one Drill Corporal from the Troop at Dum Dum, and one Drill Corporal may be sent from the three that will be at Meerut with the Troops there, or should they not be allowed to Troops, then the Drill Corporals of the three Brigades will be available, thus in either case giving five or six Drill Staff for the Horse Artillery amounting to 140 Men.

The Non-Commissioned Officers of the recruit Troop, will be 6 Serjeants, 6 Corporals, and 12 Bombardiers, supplied by the three Brigades in the ratio proposed by the Board.

5th. The European Battalion already at Dum Dum will be one of those to be employed in the training of the Foot Artillery recruits; to supply the second, it is proposed, that the Head Quarters of the Battalion at Mhow, where there is only one Company should be removed to Dum Dum, where there are two Companies of a Battalion without any Commander, except the senior Captain, and for which there is an extra Adjutant, and Drill Staff, which will by this arrangement be transferred to Mhow. This is necessary, because there is a Troop and Company at Mhow, and therefore it constitutes a Field Officer's Command, but as the allowance to the Field Officer is counterbalanced by the saving pointed out in the first paragraph, these arrangements are in fact productive of no expense.

6th. The drill Staff available, will be the 5 Drill Sergeants of the 5 Battalions, the 6 Drill Corporals of the 6 Companies at Dum Dum, if they are allowed, or the 5 Drill Corporals of the Battalions on the present Establishment.

Thus giving equally with the Horse Artillery, five or six Drill Staff for the recruits attached to each Battalion, which will amount to about 130 men. For the Non-Commissioned Officers, the 5 Battalions give 10 Sergeants, 10 Corporals, and 20 Bombardiers, for the whole foot Artillery recruits; which being divided gives 5 Sergeants, 5 Corporals, and 10 Bombardiers, for the Company of each Battalion.

7th. The only expense that the proposed arrangement entails therefore on Bengal, is the remuneration to the Commanding Officers and their Staff. The Brigade and Battalion removed to Dum Dum being already on field allowances, causes no expense by retaining them, except House rent, and the real expense therefore, is merely placing the Battalion now there on the same footing, as well as the formation of the Troop and Companies for the recruits.

8th. A full abstract of the expenses will be found in the following statement.

Expenses.

	Rupees.
House rent to the Commanding Officers of two Battalions, supposing them to be Field Officers........	200
Half Batta to one Commanding Officer supposing him to be a Lieut. Colonel..................	300
House rent to two Adjutants...................	60
Half Batta to one Adjutant...................	60
Half Batta to a riding master with house rent...	30
Command allowance to a Field Officer at Mhow.	300
An Adjutant and Non-Commissioned Staff at Mhow.	307
Allowance for 3 Troops and Companies.........	180
Allowance for 3 pay Serjeants.................	21
Allowance for 3 pay Clerks....................	90
Total expense	1548

Saved.

Adjutant and Non-Commissioned Staff at Kurnaul.	307
Adjutant and Non-Commissioned Staff at Dum Dum..........	307
Extenuated saving in forming the depôt of Instruction.....................................	150
Total saving	764
Actual Expense of the arrangement	784

N. B. The expense of Horses will be the same in either case, as they will not exceed for the Depôt, the extra number recommended for the Troops on account of recruits, in our former report on the Horse Artillery.

(Signed) J. TENNANT, Lieut. Colonel,
Bengal Artillery.

(Signed) C. GRAHAM, Lieut. Colonel,
Bengal Horse Artillery.

E.

Memorial de L'Artillerie, et recueil de Mémoires, Experiences, Observations, et Procédés, relatifs au service de L'Artillerie, redigé par les soins du Comité central de L'Artillerie de France, avec L' approbation du ministre de la guerre—No. 1 Paris, 1826. (ne se vend pas et paraîtra a des époques indeterminees.)

This is an octavo work of 320 pages, undertaken by the order, and printed at the expense of the French Government, drawn up and edited by the committee of the central depôt of the Artillery at Paris, a Committee consisting of seven General Officers of Artillery; and is the first number of a periodical series, of which the successive numbers are to appear at intervals, (it is understood,) of one or two years; the impression is limited to 1500 copies, of which one is distributed by Government to each of the Officers of the Artillery amounting to nearly 1200, and the remaining copies according to a list of names, inscribed by the Central Committee, and which must previously have received the sanction of the minister of war.

The work which is thus designed to appear periodically, and to be thus distributed, is one of several measures which the Government of France has recently adopted to stimulate the application, and to increase the professional acquirements of its Officers of Artillery; to acquaint them with all that has been done or is doing in their own or other countries, useful or interesting to an Artillery Officer; to excite their emulation in studying and to lead them to suggest improvements in the construction, or in the employment of the various engines and apparatus of war, which appertain to the service of the Artillery.

We think that we may perform an acceptable service to our readers, in availing ourselves of the appearance of the first number of the memorial, printed in the present year; to acquaint them with an outline of a part at least, of the measures which the French Government has adopted for this purpose; and with the advantages which even in this early stage, appear to have resulted from them, in the zeal, activity, and intelligence, with which they have been met by the Officers.

The Memorial de L' Artillerie, originated in an instruction communicated on the 10th of July 1824, by the Baron de Dumas, then Minister of War, to Lieutenant General Comté Vallee, inspecteur General du Service Central de L' Artillerie, directing the preparation by the central Committee at Paris, and the printing at the expense of the Government for limited distribution, of a periodical work which should have for its object, to convey to the Officers of the Artillery generally, a knowledge of the successive improvements introduced, or the modifications adopted in the Materiel, or in the different branches of the service of the Artillery; of experiments made or commenced, and of others proposed as deserving of consideration previously to their being made; having for their object the improvement of what may be specially termed the science of Artillery, or the correction, or simplification of any of its practical details; to be a record of inventions already existing in the repositories, or which may hereafter be deemed worthy of admission there; giving of each a sufficiently precise description, and noticing the advantages or disadvantages which may have appeared on trial; together with such extracts and translations from foreign works, as also all such other matters, as in the judgment and discretion of the Committee should merit insertion, with a view to the propagation of valuable knowledge in the Service.

The same communication from the Baron de Dumas, announced the intention of the Government to allot a sum of 3500 francs annually, to form three prizes, to be entitled premiums of encouragement, and to be given in recompense to Officers who in the course of the year shall have presented views or discoveries useful in one of the branches of the service of the Artillery; or who shall have resolved with success, the questions which the central committee, viewing the points of the service to which it is most desirable that the attention of the Officers should be directed, shall have proposed as subjects for their consideration; the questions to be lithographed and distributed to the Officers; the success with which they may be resolved, to be judged of by the committee, who are authorized to avail themselves in special cases of other judgments in aid of their own, but to be themselves responsible for the decision. The sum to be divided into three premiums, the first of 1500 francs, and each of the other two, of 1000 francs; and each premium to be further liable to a division between two competitors in cases where there is no decided superiority. There may therefore be as many as six premiums in one year, when each will be about the value of 600 francs; or there may be fewer, when one or more will be of 1000 or 1500 francs value, or finally, the premiums or a part of them, may not be adjudged at all; it is further provided, that communications be distinguished by a private mark, such as a motto or a sentence quoted from some work, which shall also be attached to a sealed paper containing the name of the writer, not to be opened until after the decision, and then only those which belong to the successful communications; the papers containing the other names to be destroyed unopened. The premiums to be presented in a medal of the value of about 600 francs, and the difference of value (as when the premiums are not divided,) to be given in money. The approved communications to have the further distinction of being inserted in the memorial, with the name of the author, excepting when the subject is of a nature, in the view of the Government, to render publication objectionable.

The questions proposed for solution in the first year of the establishment of the premiums (1825) were the following, viz.

1st. To contrive an instrument or a system of instruments, and to describe a mode of procedure, by which the coincidence and the rectilinearity of the axis of the interior, and exterior surfaces of cannon, may be strictly verified.

2d. What are the different cases in war, in which Ricochêt fire ought to be employed in preference to direct fire? What are the circumstances in which the Ricochêt fire at high angles, and the same fire at low angles, ought respectively to be preferred? if sufficient experiments are wanting, from whence the solution of this question may be derived, to propose the scheme of such experiments as may conduct to a solution. To examine specially the state of instruction of the French Artillery relative to Ricochêt fire, and to point out the most simple means of its improvement.

3d. The third subject is left in the first year to the discretion of the Officers. All memoirs which present new views, discoveries, or useful propositions, relative to any one branch of the art of the Artillerist will be received.

The communications to be completed and sent in by the 1st November 1825.

Sixty Memoirs were the result of this first appeal to the zeal and intelligence of the Officers; of these, thirty-five were devoted to the first question; seven to the second; and eighteen to subjects selected by the writers themselves, conformably to the latitude permitted by the terms of the third question.

Of the thirty-five memoirs having for their object to contrive an instrument to verify the correct centering of guns, not one of the instruments proposed, or of the method of procedure recommended, was deemed by the committee to satisfy all the required conditions, preserving at the same time sufficient simplicity for use; the premium for this question was consequently not awarded. Three however of the memoirs were judged worthy of honorable mention, and of having the names of writers ascertained; to each of whom by a subsequent special instruction from M. DeClermons Jannere, the present minister of war, a sum of 500 francs was presented. In the memorial is inserted a brief analysis and classification of the principles of the methods by which the several writers proposed to attain their purpose, omitting the technical details. In six of the memoirs, the axis of the exterior surface was taken as the basis of verification, and in twelve others the axis of the interior surface, or bore, was made the basis; of the latter twelve, seven proposed to effect the verification by an apparatus borne by metallic rods; and five by the employment as the axis, of a ray of light, which joins to its rectilinear property, the additional advantage of not bending by its own weight, which is the inconvenience to which metallic rods are subject. The three memoirs which are honorably mentioned belong to this class, one to its first and two to its second subdivision. The remaining seventeen memoirs classed together, are distinguished by the common quality of proposing to effect the verification with the gun placed in a vertical position, so as to avoid the liability to flexure in the apparatus employed.

The committee announce, that it has become necessary to submit the same question to a second year's consideration, as the model of an instrument has been presented subsequently to the period named for the reception of the memoirs, approaching in its principle, to those contained in the first of the above classes, and which from the apparent simplicity of its operation, has been judged worthy of being made full size, so as to be submitted to experiment.

Of the seven memoirs relative to Ricochêt fire, one has been judged very superior to the other six, and of sufficient merit to justify the award of the premium of 1500 francs; the author is Lieutenant Colonel Lyantey, second in command at Strasburgh, one of the Head Quarter stations of the French Artillery; his essay is printed in this number of the memorial, and is spoken of in terms of high commendation in the report of the committee on the adjudication of the premiums. We propose in the sequel to give a brief analysis of the arrangement and contents of this essay, not less in regard to its intrinsic merit, than in consideration of the interest and distinction which attach to it at this moment in France.

Of the eighteen memoirs devoted to the third question, several were considered as not coming within the proposed limits, as they treated on subjects of the military art, having but a very indirect relation to the service of the Artillery.

Others presented useful views, but none amongst them possessed sufficient general interest, or was drawn up in a sufficiently able manner to justify an award.

Thus then in the first year, though sixty memoirs have been presented in competition ; but one premium has been adjudged : a wise frugality, that in witholding raises the value of the distinction sought, and calls forth encreased exertion to obtain what is not too readily given.

We conclude this part of our subject with the questions proposed for the second year. In consequence of their importance and the extent of rescearch which they will require, the committee have decided on passing over the present year, and have appointed the 1st. of September 1827, as the day on which the memoirs related to them are to be completed and presented.

1st. To discuss the respective employments of Horse, Water, and Steam power, in the machines employed in the various departments of the Artillery ; viewing their suitability to particular branches, or the influence of circumstances on each in different localities. To indicate in each case the mode of transmitting the force, the most simple, the least liable to derangement, offering the least resistance to be overcome, and presenting the greatest facility of regulation, or of being moderated at will ; to apply the result of this investigation, to some one of the several machines employed in the department of construction, adopting for that purpose any of the three powers above mentioned ; and examining the several effects of friction, re-action, and in general of resistance of every kind, which is a physical consequence of the composition and movement of the machine ; to investigate the relation between the force employed, and the effect produced, both theoretically and practically, resting the latter on satisfactory experiments. The memoirs to be accompanied by plans of the machine and by numerical and relative calculations.

2d. To discuss the circumstances in which the fire of case shot has a preference over that of round shot or shells ; and the distances at which case shot produce the most advantageous effect. To determine the size, the number and the arrangement of the balls best suited to each calibre, and to each kind of Ordnance; as also the form and thickness of the bottom. To point out the nature and qualities of the metal most proper for the balls. To show the most advantageous proportion between the weight of the case shot and the charge, deduced from experiments already made, or to point out those which it may be desirable to make for that purpose. To compare in all respects relating to this species of fire, the customs of Foreign powers with those of France.

3d. To establish for the cartridges of Infantry, the relation which ought to exist between the weight of the ball, the nature and weight of the powder, the windage, the bore, and the length of the barrel, and whole weight of the musket; in order to obtain the most advantageous range, diminishing at the same time as much as possible the recoil. To investigate the effect of force in ramming down the charge, on the range and on the recoil. To compare under all these heads, the arms of Foreign Infantry, with those of the French Infantry. To examine the principal experiments hitherto made on the subject of this question, and if they shall appear insufficient, to submit a scheme of such experiments as shall enable its complete solution. To investigate the advantages on the one side, and the inconveniences on the other, of having cartridges of two kinds, differing in weight and calibre; one for the Infantry and the other for the Cavalry. To compare the arrangements of Foreign Powers in this respect with those of France.

Not the least interesting or important part of the memorial, is the portion allotted to a description of the changes which from time to time shall be introduced in the system of the materiel, or in any other branches of the service of the Artillery.

The present number contains a succinct account, arranged under different heads, of the principal objects of improvement which have occupied the attention in the last year of the Central committee, to whose judgment all suggestions are referred, and under whose superintendence those which are approved are carried into effect. A new system of Pontoon exercise and manoeuvers, rendered necessary by a recent reform of the establishment, and an alteration in the equipment of pontoons, has been submitted by a Board of Officers of the Corps, specially appointed for the purpose, and has been approved. Several minor improvements relative to small arms are detailed, principally in regard to the system of their repair and issue. An alteration in the construction of the carriages and waggons of the Field Artillery, had been for some time in contemplation in the French Service; and Carriages on a new model were submitted to trial in the years 1824 and 1825, at the Head Quarters of five of the Regiments of Artillery; the essential difference from the old construction (that of Gribeauval) consisted in the mode of attaching the Limber to the Gun Carriage; in making all the wheels of the same height; and in the Limber of the Gun and waggon being alike, and of course interchangeable where occasion may require; all these improvements are adopted with modifications from the British service, and we remark with pleasure, the readiness with which the superiority that the British Carriage department had attained is admitted. The reports from the five Head Quarters were unanimous in approval of the new construction, except in regard to the mode of draft, it having been proposed to substitute the English custom of shafts, for that of the pole, used previously in France. On the expediency of this change a difference of opinion is stated still to exist, and in consequence nine Brigades consisting of different field Ordnance in pairs,one of each being fitted with a pole,and the other with shafts, have been sent to the nine Regiments of Artillery including that of the Guard for another year's trial; and various improvements in the harness have been submitted at the same time. A new carriage for the Artillery employed in Sieges, which has been some time on trial, is finally approved and its adoption ordered. The model of a carriage for heavy Ordnance, to replace the Garrison Carriage of Gribeauval, and to be at the same time applicable to Batteries on the coast, is described, and is put in course of trial. But the most important service in their own view, on which the Committee has been employed in the past year, has been a thorough remodelling of the courses of practical instruction, which the Officers of the Artillery are required to pass through, after they have completed their education, in the Elementary schools, and have joined the Head Quarters of their respective Regiments.

On quitting the Ecole Polytechnique, each individual according to the profession, or branch of a profession for which he is destined, joins a particular school of application as it is termed; *i. e.*, where the general principles of the sciences he has acquired, are taught in their specific application, to the profession to which he is to belong. This school for the Officers of Artillery is at Metz, where they remain two more years, they are then appointed to one or other of the Regiments of Artillery, and join its Head Quarters. There are eight regiments having their Head Quarters, respectively, at Strasburg, Metz, Douai, Toulouse, Rennes, Auxonne, La Fere, and Valance, exclusively of the Artillery of the Guard at Vincennes. They remain under instruction for the first three years, unless their services are called for intermediately to accompany the part of the Regiment to which they belong in Campaign, in which case however, they are obliged to complete the period of three years on their return to Head Quarters, nor can this condition be dispensed with, except when a Lieutenant gains during his absence, the rank of Captain, either by distinction, or by succession; it is for this period of three years, that the general instruction at what are termed the Regimental Schools, has been revised by the Central Committee; and a scheme embracing and arranging the whole, has been submitted to the Government, approved, and ordered to be adopted at each of the Regimental Head Quarters. This scheme arranged in Synoptic Tables is printed in the memorial, and particularizes the different subjects on which the Officers, Non-Commissioned Officers, and Soldiers, are to be respectively instructed. Such subjects as will admit of Practical illustration, such for example as the duties of Artillery in Seiges, are studied at the Polygons, which are works constructed of the proper form and dimensions, in which the proceedings in attack and defence are practically gone through; but of necessity the greater part of the subjects require to be treated didactically, for which purpose the form of lecture is preferred. Under the advice of the committee, thirteen distinct courses, all on subjects of primary importance, are in preparation by individuals selected from among the Officers, and from the professors attached to the schools, and are expected to be completed in the present year. Not content with the bare indication of the subject, the committee have themselves pushed the consideration of each so far, as to specify the number of lectures that it shall occupy, and to prescribe the outline of the contents of each particular lecture; all of which detail is printed in the memorial, and by a special direction of the minister of war, the Officers of Artillery generally are invited to compete in filling up the courses, with the individuals to whom they have been severally intrusted. The outline of the thirteen courses, occupies sixty-eight pages, and we regret that our limits oblige us to confine ourselves to the specification of the several subjects, and to the outline of one of the courses, which will however serve to shew the comprehensiveness as well as the detail in which each subject has been viewed by the committee.

Subjects of the Courses.

1st.—On the theory of Projectiles—Eight Lectures.

2nd.—On the construction of Ordnance—Eight Lectures.

3rd.—On the construction of Gun Carriages, and of other Carriages appertaining to the Ordnance—Seven Lectures.

4th.—On the construction and employment of the various machines required in the Arsenals, Laboratories, and Manufactories belonging to the Ordnance—Ten Lectures.

5th.—On the process adopted in the smelting and forging Iron, for its various applications in the service of Ordnance—Eight Lectures.

6th.—On the founding of Cannon—Ten Lectures.

7th.—On the Manufacture of Small arms—Twelve Lectures.

8th.—On the Manufacture of GunPowder Eleven Lectures.

9th.—On the service of Artillery in the field—Eight Lectures.

10th.—On the service of Artillery in Sieges—Eight Lectures.

11th.—On the service of Artillery in the defence of fortified Towns—Nine Lectures.

12th.—On the service of Artillery in the defence of coasts. — Three Lectures.

13th.—On the construction of Batteries—Six Lectures.

(True Copies.)

(Signed.) J. Stuart, Lieutenant Colonel.

Offg. Secretary to the Government of India.

Military Dept.

FORT WILLIAM, 30*th January* 1838.

INDIAN FIELD GUN CARRIAGES.

The Board having in their proceedings of the 12th July 1836, resolved to adopt the cheek pattern carriages, for Field Artillery,* introduced by Colonel Cullen at Madras, as the groundwork of the Indian carriages to be established for the general service of the three Presidencies; their first object was to satisfy themselves that, in every respect, the dimensions of the cheeks were sufficient, and doubts having been entertained on this point, a 12 pdr. howitzer carriage was constructed under their orders, with the Bengal wood, but exactly corresponding in pattern to that received from Madras, with the few trifling alterations already agreed to, by the Board. Experiments were then made with this carriage, and the existing carriages of the three Presidencies, as nearly as possible under similar conditions; but so as to afford a perfect assurance, that they would not undergo a more severe concussion on actual service under the most trying circumstances.— The result is set forth in the annexed reports from No. 1, to 17† and the Board particularly remark, that of the 16 carriages there were 10 made of Teak wood, 5 of Saul wood, and 1 of Sissoo wood.—Of the 10 Teak wood carriages, 5 failed; of the 5 Saul wood only 1 failed; the beam of the Sissoo wood carriage was split, but it had apparently been altered subsequently to its original manufacture, to receive an elevating screw of a new pattern; and in consequence had no less than six perforations at the point where it gave way.—The Board would further observe, that the carriages entered in the reports Nos. 2. 3. 4 and 16† are all of the same principle of construction, and without the wooden beds to the axletrees.— From the nature of the injuries these carriages have received, it is evident to the Board, that this has, in some degree, contributed thereto, and they are therefore of opinion, that no gun carriage should be made without the Iron axletree being imbedded in wood, to break the jar which is otherwise occasioned by the firing.—This consideration determined the Board, in a great measure, in favor of the Madras pattern, in preference to the Bombay pattern cheek.

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* Page 8. †These reports not given.

It having been thus ascertained, by experiment, that the carriage made up by the Board received no injury whatever under severe trial, and a similar result being also obtained with a 6 pdr. carriage, which was constructed under their orders, on the same principle as that of the howitzer, the Board conclude that there is no cause to apprehend any want of strength in the proposed equipment. The result of these experiments, however, leads the Board strongly to recommend to Government, that Teak wood should never be used either for cheeks, axletree beds, or any part of the wheels of gun carriages, but rather that the same kinds of wood should be used as in Bengal, unless on enquiry equally good wood can be found contiguous to the other Presidencies. The superiority of Saul for cheeks is manifest, except in the instance of its great specific gravity, but the Board think, this more than compensated for by its other qualities, and especially its durability, until as good a wood of less specific gravity may be found out.—The objection to Teak wood in cheeks, axletree beds, or beams, appears to arise from its being used in its defective state, and yet the Board have been unable to discover any outward appearance which indicates this state. The Board cannot doubt that every care was used, both at Madras and Bombay in selecting the wood, as well as the carriages sent round; and could it have been ascertained by inspection, that the wood was in the state they found it to be at the fractures, it undoubtedly would not have been used.—The Board presume therefore, that the Madras as well as the Bombay Agents, have been deceived by appearances, against which they do not know of any security for the future; and as in Bengal, the difficulty of selecting Teak wood has been long found to be so great, that, that wood has in consequence been nearly discontinued in the principal parts of the carriages of that Presidency, the Board are unanimous in condemning the use of this wood for cheeks, and axletree beds, even when the Teak wood is of the best quality; could any means be pointed out by which this could be discovered from outward appearance, the Board are of opinion, that increased dimensions for the cheeks would be requisite to those which they have adopted, with reference to the Bengal woods only, and the difference of weight would thereby be greatly counterbalanced; for the Board by no means think that the dimensions of the Madras cheek, much less those of the Bombay ones, are sufficient for Teak wood.—The Board are quite unanimous in thinking, that no wood in India, used in the Gun Carriage Department, can be more objectionable for spokes and felloes, than Teak wood, even when of the best kind.—For felloes of wheels, the Sissoo wood is commonly used in Bengal, and appears to answer remarkably well, especially if the crooked pieces, very common in this description of tree, are selected.—Baubool too, if procurable, makes excellent felloes, and was formerly used in Bombay for the purpose, and either Sissoo or Soondry woods are well adapted to spokes, (especially the latter, which the Board think particularly suited to this purpose) and these woods may be introduced into the Madras and Bombay Carriage Manufactories if equally good woods are not procurable. Their objections to teak wood, the Board extend to its use in wheels of all carriages, as well as to their poles, but the frame work of waggons, carts, and other carriages for burden, may be made of teak and other light woods as at present, it being of more importance in these parts to consider weight, than absolute strength; nevertheless, the Board would recommend that the ammunition boxes should be made of good deal planks (if to be procured in sufficient quantity) in lieu of teak plank as at present, but in this case it should be observed, the deal is of the best kind, as much is now imported from America, which has little or no advantage in weight over teak, and is in no other respect superior to it for boxes. The Board make these observations with reference to the weight of the carriages proposed by them, which are indeed, somewhat heavier than those of the existing carriages in the Madras and Bombay Presidencies, though nearly of the same weight with those of Bengal. The Board have not been unmindful of this very important object, but they think the reports annexed* will be satisfactory, in shewing that attention to this may be carried too far, and they have felt bound to establish confidence in the strength of the carriage, as a primary object even at some sacrifice in weight. The Board observe, however, that the carriage proposed by them, is so balanced, and the iron work at the trail so modified, as not to require a greater power to limber it up, than the ordinary weight for the lightest carriages of the old construction.

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* Not given.

The Board have observed in the course of the construction of the carriages now submitted, a practical proof of the advantage of adopting the cheek, in affording the opportunity for examining the interior of the wood. Trees which have been selected, with every attention to outward appearance, have nevertheless proved so defective internally, as to be rejected for cheeks, and the Board are satisfied, that had a beam been cut out of the same tree it must have included the defective wood, and have consequently been deficient in strength, without its being possible to have discovered it.

With these observations, the Board proceed to determine rules by which the cheeks of the carriages proposed by them, are to be constructed, adhering in general principles to those apparent in the Madras construction, and to the proportioned dimensions derived from the two carriages, which have so satisfactorily stood proof; they have calculated the dimensions from a plan of the checks drawn by rule, and they beg leave to detail such as are requisite in the construction of the carriage, with their general observations thereon, for the information of Government. The detail* of the calculations supplied by Colonel Tennant, are also annexed to this document for future reference, if necessary, but what is here submitted is sufficient, in the opinion of the Board, to correct any errors which may arise in construction from mistakes in the workmen, in copying patterns, and will even enable a gun carriage agent or other magazine officer, to cut out a cheek without the pattern. Each cheek is to be cut from a plank exactly rectangular, and of the following dimensions.

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* Detail not given.

	Length	Breadth	Thickness
	Inches	Inches	Inches
For the 24 Pounder Howitzer.	125·48	14·5	5·63
„ „ 12 „ „	122·24	12·0	5·63
„ „ 9 „ Gun	122·33	12·0	4·98
„ „ 6 „ „	121·20	11·0	4·25

The rough plank should be left a little larger than these dimensions, but they are to be accurately marked out on the plank, as the groundwork of the construction which is as follows.

PLATE 1. ELEVATION FIGURE 1st.

A. B. D. C. The plank.
D. E. from the head of the cheek to the back of the trunnion holes.
D. A. the breadth of the plank or head of the cheek.
E. F. is half the diameter of the trunnions of the piece.
D. G. from the head of the cheek to the shoulder, where it ceases to have its two sides parallel, and commences to be contracted to the trail, is 30 inches in all the carriages.

	24 Pdr. Howitzer Inches	12 Pdr. Howitzer Inches	9 Pdr. Gun Inches	6 Pdr. Gun Inches
A. O. from the head of the cheek to the front of the axletree bed	15-78	12·53	12-62	11·5
D. F. from the head of the cheek to the centre of the trunnion holes	12-535	10-20	10-29	9-53
B. I. from the extreme of plank to ground line	10-58	These dimensions are the same for all the carriages, that the iron work of the trail and limbering eye may be alike.		
B. W. lower corner of the plank to the end of the ground line	3-85			
I. W. ground line cutting the plank at the trail.	3-85			
I. S. &. I. T. the extent of the trail from the point I.	6-5			
S. U. & T. V. each perpendicular to the side of the plank at S. &. T.	6-5 11-23			
V. X. taken in V. B. which should be perpendicular to I. W. and terminate in B, being also 11-95 inches long.	5-0			

These points being ascertained, the outline of the cheek

cheek is determined by joining G U, U V, V X, by straight lines, and describing the curved part of the trail as follows.

Bisect SI, in *a* and draw *ac* perpendicular to SI, making also I*b*, in IW, equal to I*a*, and *bc*, perpendicular to IW meeting *a*, *c*, in *c*. The point *c*, is then the centre of the arc *a b*, join *b*, X, and bisect it in *e*, drawing *e*, *d*, perpendicular to it, and meeting *b*, *c*, in *d*, the point *d*, is then the centre of the arc *b*,X, and finishes the outline of the cheek.

TRAIL BOLTS &c.

Bisect VX, in *f*, so that V, *f*, will be 2½ inches, and draw *f*, *g*, parallel to V, U, (which is also parallel to I, W, the ground line) until it meets the line H, *h*, drawn from the centre of the two extremities of the cheek, in the point *g*; then *g* is the centre of the inner trail bolt connecting the cheeks. The outer trail bolt is determined by making *f*, *i*, =*f* V, or 2½ inches, then *i* is the centre of that bolt. These bolts also fix the trail handles, the bent part of which forming the grip, is between 12 and 13 inches long. The limbering eye is to be fixed by a swivel at the point *f*, and is to stand perpendicular to the end of the trail X V, and consequently parallel to the ground.

THE FRONT TRANSOM.

The front transom is placed with its back in the line parallel to the head of the cheek, at the distance A Q, of the front shoulder of the trunnion hole, and its lower edge one inch from the lower edge of the cheek and parallel to it. This transom for all the carriages is 7·5 inches long, and 3·5 inches broad, and is let into each cheek ½ an inch. The front bolt connecting the cheeks at the head passes through the centre of this transom.

CENTRE TRANSOM.

In the upper and lower edges of the plank take two points *w* and *q*, at the following distances from the head of the cheek,

	24Pdr. Howr.	12Pdr. Howr.	9Pdr.Gun.	6Pdr. Gun.
D,*w* Inches	34·81	30·72	45·35	40·32
A *q* Inches	40·10	34·72	49·72	44·32

and join these two points by a line [*] *w q*, crossing the cheek obliquely. From *w* the upper point set off the following distances downwards towards *q*.

	Ins.		Ins.
24 Pdr. Howitzer	9·11	=9 Pdr. Gun.	6 94
12 „ „	7·9	=6 „ „	6·86

and through point *r* thus obtained, which gives the centre of the upper surface line of the centre transom draw a perpendicular to *w*, *q*, to give the line of that surface. This transom, is to be of the same dimensions as the front transom ; viz. 7·5 inches by 3·5 inches and it is calculated that it is so placed, as to admit of 15 degrees elevation to the howitzer, and 10 degrees to the gun, without taking out the elevating screws. The transom is also let into each cheek ½ an inch, but besides this, the Board have strengthened its support by a reinforce to the cheek, supplied by the plank itself; and the gun[†] transoms are further to be prolonged between the cheeks, to their lower edge, the object of both of which will be explained hereafter. The connecting bolt of the cheeks at the centre, is passed through the upper rear corner of the transom in howitzers, &c. for guns in the lower corner, which is bored away so as to leave no projection of the bolt.

AXLETREE BED.

The axletree bed, in all carriages is 6¼ inches broad, and 5½ inches deep, of which last one inch is let into the cheek, to which it is secured by strong iron bands, fastened by two bolts in front, and two in rear of the axletree.

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[*] In order to use the capstan headed screw, the Board advance the line *w*, *q*, 3½ nches.

[†] The Board have since determined that the transoms shall be all alike.

TRUNNION PLATES.

The wood of the cheeks at the trunnion holes, is to be cut out with a circle described from F as a centre, to the thickness of the plates in addition to the diameter of the trunnions, but the wood of the shoulders of the trunnion holes, measured downwards from the edge of the cheek, is only to be removed to a depth of $\frac{1}{4}$— the thickness of the plate, three fourths of which will, therefore, project above the diameter of the trunnions, and the sides of the trunnion holes in this projecting part, will be made perpendicular to the edge of the plank. The cap squares are to fit close down on the trunnions and to the plates.

PLATE I. PLAN Figure 2nd.

The dotted figure A, B, C, D, represents the edge of a plank of the dimensions before given. On one side of this take D F equal to 30 inches (or to D, G, figure 1st) and from the opposite side set off A E, equal to the thickness of the cheek, which is as follows for the different natures.

24 Pdr. Howitzer	3·75 Ins. =	9 Pdr. Gun —	3·50 Ins.
12 Pdr. Howitzer	3·50 Ins. =	6 Pdr. Gun	3·00 Ins.

Join E, F, and draw A, G, parallel to it, which gives the head of the cheek. From the trail take B, L, equal to 20·85 inches, (B, *x*, figure 1st) and B I, of the following dimensions for the different natures.

	Ins.		Ins.
24 Pdr. Howitzer	1·35=	9 Pdr. Gun	1·07
12 Pdr. Howitzer	1·05=	6 Pdr. Gun	0·89

Join L ,I, which gives the line of the centre joining of the two cheeks, connecting the solid trail. In this line take IK. equal to (BI,figure 1st) 10·58 inches, and join G.K. for the near side of the cheek, to which draw F *m*. parallel, terminated by a perpendicular to LI., drawn through a point J, taking 6·5 inches from K. (or equal to I.T. figure 1st) the point *m* will then correspond with V figure 1st, and the line *m* J, fixes the length of the trail to that point, through L draw L *b* perpendicular to L I, meeting the line of the inner edge of the cheek in *b*, and L. *b*, is the projection of the solid part of the trail, which is rounded off, as in the plan, when the two cheeks are joined together; although the triangular part LIB of the plank is superfluous, it is recommended not to be cut away until the cheeks are joined, doing which it must be observed, that the points L of each cheek are accurately to coincide; the heads E.F. and N.O. are to be placed exactly parallel to each other, and to the prolongation of the line L to H.—The centre joining of the trail part of the cheeks should therefore, be carefully adjusted to this position of them. The distance between the heads of the cheeks varies with the calibers & natures of the pieces.—For howitzers this distance is equal to the diameter of the base ring, increased by one-tenth of an inch; hence in the 24 pdr. howitzer it is 13·05 inches, and for the 12 pdr. howitzer 10·3 inches.—For the guns, this distance is equal to the width across the shoulders of the trunnions, increased by ½ an inch; hence for the 9 pdr. gun it is 9·85 inches, and for the 6 pdr. gun 8·3 inches —The difference is occasioned by the necessity of allowing the breech of the howitzer to descend between the cheeks to afford higher elevations, than for guns.—The half inch which is given for guns, between the cheeks, in excess to the breadth of the trunnion shoulders, is to be adjusted by a shoulder to each trunnion plate, projecting inwards ¼ of an inch, and equal in breadth to that of the shoulders of the trunnion of the gun; when the difference between the distance of the heads of the cheeks of a howitzer (as determined above) and the breadth across the shoulders of the trunnions of the piece does not exceed this ½ inch, as is the case with the 12 pdr. howitzer: it is adjusted in like manner by a projecting shoulder to the trunnion plate, but when the difference between the distance of the heads of the cheeks and the breadth across the shoulders of the trunnions of the piece, exceeds ½ an inch (as is the case with the 24 pounder howitzer) one-half of this excess is to be set off at the trunnion hole shoulders inwards, from the inner line of the cheek A. G. and N. O. to the points *c. d. e. f*, and the inside of the head of the cheek is then to be completed by joining *c*, A, *f*, N, and drawing *d. c. e. f.* parallel to the lines A, G, N, O, of the original cheek, thus preserving the parallelism of the heads by adding a reinforce to their thickness, and unless the gun is of some extraordinary hape (which the Board do not think probable) the projection of this reinforce would never exceed the part of the original plank, which would otherwise be removed, a consideration which ensures against increased difficulty, and expense in providing the half-wrought materials.—The Board considering also, that the centre transom, when let into the cheek only $\frac{1}{8}$ an inch, as they have above prescribed, would be liable to failure from the strain which they sustain in firing, and that the cheek would be materially weakened were they let further into it, have added another reinforce at this point, which is to be taken fully $\frac{3}{4}$ of an inch inwards, when the plank will admit of it, and if not, it will be made equal to the whole thickness of that part of the plank, which would otherwise be removed, to form the bend of the cheek. This reinforce is made parallel to the inner edge of the cheek, for the whole breadth of the transom; but is to be gradually sloped off, from the front and rear edges of the transom towards the head and trail, to the proper thickness of the cheek as above defined (Figure 3d Plate the 1st.) The front slope for gun carriages will terminate in the points G, and O, where the contraction of the trail commences; but in howitzer carriages, it will terminate in the rear shoulder of the trunnion hole *d*, and *e*. In the gun carriages also, the reinforce is left nearly the whole breadth of the cheek, so much only being removed as to admit of the handles of the screw being turned between them. So that in reality, the body of the transom will be let into the wood $1\frac{1}{4}$ inches, which is equally necessary both above and below it, to resist the effect of the strain which is exerted upwards, as well as downwards, from the elevating screw being * attached to the cascable.—But as the screw of the howitzers is not attached to the cascable, the strain acts downwards only, and the reinforce is not required above the transom, it is consequently removed in these pieces from above the upper surface of the transom, to admit of their being lowered between the cheeks when necessary as far as this reinforce is removed, that the rear shoulder of the trunnion holes from *d* and *e* will be sloped off to terminate in the angle of the bend of the cheek at G, and O, in the 24 pdr. howitzer and other carriages which may have this last reinforce.

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* The Board after mature deliberation and trial of this plan, have resolved to have the screw unattached to the breech as in the howitzer.

ELEVATING SCREWS.

The elevating screws of the guns should be 20 inches long, including the head, which is not to stand higher (when measured to the centre of the loop) than 8 inches from the upper surface of the centre transom when the screw is close down, or the gun at its highest elevation. The screw being attached* to the elevating loop of the gun, must pass through a female screw working upon moveable trunnions, which are supported by iron bolts of the same thickness as the breadth of the reinforce of the cheek, and let into them for their whole thickness, and resting in the transom by a shoulder projecting inwards about ½ an inch.— These bolts are not thicker than the width which the reinforce exceeds the cheek, that they may not encroach on its *real* substance, and yet have a support of about ¾ of an inch on each side. Their breadth will be determined by the breadth necessary for the holes to receive the trunnions of the screw. The bolts are to pass completely through the transom in its centre, and their lower ends to project below the cheeks being fitted with screws and nuts, to receive,and secure a bar of iron,which crosses from cheek to cheek below, and rests upon them; being kept, in its place by the nuts on the bolts, and thus prevents them being drawn out by the action of the gun in firing.—The transom is prolonged (as before described) to afford support to this band between the cheeks, but it is to be bored out for the screw, and the band will also be perforated to allow of its passing through, and having proper play.—The prolonged part of the transom is only, however, to be let about ¼ of an inch into the reinforce of the cheek, and not to pass into the cheek itself; like the body of the transom (see section of the gun transom and elevating screw plate 3 & 4). The elevating screws of the howitzers are to be 16 inches long, including the head which is made flat, and the circular

† Screws are alike by a subsequent determination of the Board see centre transom.

part being 4¾ inches in diameter, upon which the base ring of the piece rests, but unattached.—The head must not be more than 5 inches above the upper surface of the transom when close down, and the piece at the highest elevation, it works in a female screw attached to the transom in the usual manner. The handles of the elevating screws of both guns, and howitzers, are to be turned upwards to work clear of the cheeks and transoms.

AXLETREES.

The Board after observing the action of the wheels in the axletrees formerly proposed by them, have unanimously determined, to make the axletree arms 2·5 inches diameter at the linch end, instead of 1·5 as formerly proposed; retaining however, the diameter of 3 inches at the shoulder; thus making them less conical. They have also determined, that the centre lines of the arms, shall lie in a straight line from end to end of the axletree; and not the lower surface as formerly proposed.—The principal object of these changes, has been to obtain accuracy in finishing (which they found difficult to procure under their former determination) and yet to retain all the practical advantages which were of any great moment (See plan of axletree, Plate 4.)

NAVES.

The alteration in the shape of the axletree arm, has made a corresponding alteration necessary in the nave box, which is consequently widened towards the linch end.—The Board conceiving too, that it was of importance to have the nave box of the greatest possible length, consistent with the already determined length of the axletree arm, have agreed to discontinue the small brass washer in use at Madras, and to add its thickness to the length of the nave box, which will now be 10·05 inches.—With a view also to facility in making the naves, at the same time that they sacrifice no useful object, they have determined to discontinue the collar at the shoulder of the axletree.—A plan of the nave as modified above, is added for the information of Government (Plate 7.)

WHEELS.

The Board fix the following dimensions for the wood work of the wheels when finished.

Felloes.	Length	inches		30· 0
	Breadth	,,		3· 75
	Depth	,,		3· 75
Spokes.	Length	,,		26· 93
			Nave	Felloe
	Thickness		1·88	1·58
	Breadth	at base		3· 7
		at felloes		2· 5

The dish of the wheel the Board fixes at 3 inches, measured between a perpendicular let fall from the centre of the nave box to the ground, and a radius of the wheel drawn from the same point; which is equal to 2¼ inches measured from a perpendicular let fall from the circumference of the nave plate close to a spoke, and a radius to the wheel drawn from the same point (Plate 6).

The Boatd make the following observations as necessary to be attended to, in putting a wheel together.

The spokes should be so formed, at the end which enters the nave, that they may closely fit to each other; and that when pressed to the centre they may form a compact body, on the same principle as an arch. Hence when the tire of the wheel is put on hot it affords the necessary pressure by contracting as it cools, to ensure this compactness of the wheels. The ends of the spokes next to the nave box must not therefore, touch the box, but a free space of about ¼ of an inch must be left between them. The triangular bolts should also press against the spokes when they are fitted home, to prevent them drawing outwards from the nave in case of occasional shrinking, which would tend very much to weaken the wheel. But there should be no shoulder to the spoke outside of the bolt, which by resting on it would prevent the action of setting up the wheel and be extremely liable to cause the spoke to split under that operation, or if at all loosened in travelling; care should also be taken that the spokes are of sufficient width to fill the space between the plates, when fully screwed up; and should indeed, be left rather in excess, and their fitting nicely adjusted by rasping them; when the spokes of a wheel become loose from shrinking, the Board think, that under most ordinary circumstances, the remedy may be applied without the tedious operation of setting the wheel up, which requires to remove the tire, and to contract it. If spaces are formed between the spokes by shrinking, the plate bolts as far as necessary may be removed, and thin wedges of wood may be introduced to fill up the spaces. These wedges being cut off to a proper length, will be secured by restoring the bolts which pass over them. If the space is left between the plates and the spokes, the outer plate must be removed, but without disarranging the spokes themselves; and as they are broader at the end towards the nave box, than at the edge of the plates, if the excess of width is removed from one side and wedges applied to the surface of them, with the thicker end downwards, and of sufficient thickness to fill up the space between the spokes and the plates, they will be secured by the pressure of the plates when again screwed together, and thus make the wheel tight. The Board recommend (in order to break the jarring noise to which these wheels are liable, by the wood playing upon the metal) that a piece of leather may be inserted between the spokes and the plates, before they are screwed up; with these precautions, the noise will be as much obviated as possibly can be expected in this climate; and greater compactness will be given to the nave; in cases of excessive shrinking, however, the wheels must still be set up anew, in the usual manner, by removing the tire; but when this is done any wedges which may have been introduced between the spokes should be previously removed, or thinned as much as practicable.

The two interior edges of the felloes, with the spokes, are to be rounded off, and their upper breadth to be somewhat contracted between the spokes, to throw off mud and sand in heavy roads. The lower surface of the felloes, and of the tire, is to be made parallel to the centre line of the axletree arm, so that the exterior circumference of the wheel shall be part of a cylinder. Although the Board do not think it necessary, that the wheels of the 6 pounder and 12 pounder howitzer, should be equally heavy with those of the 9 pounder and 24 pounder howitzer, yet as the difference would be trifling, and as the advantage of having all wheels of

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Fig. 2 for

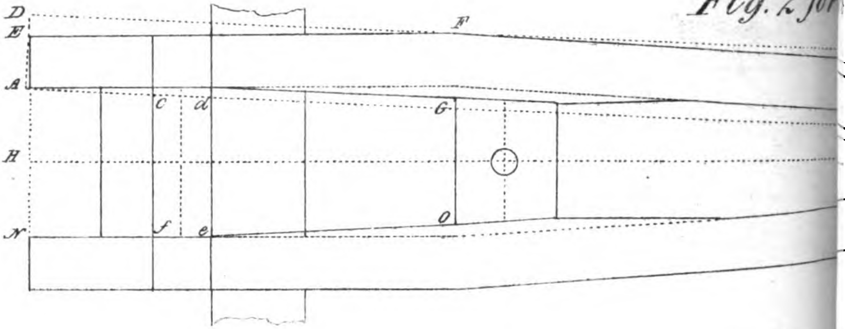


Fig. 3

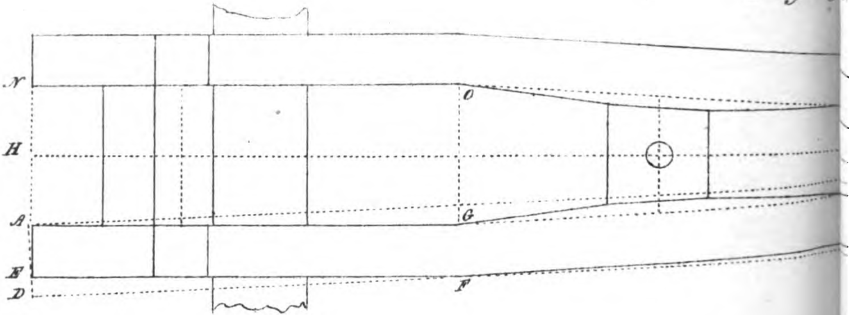
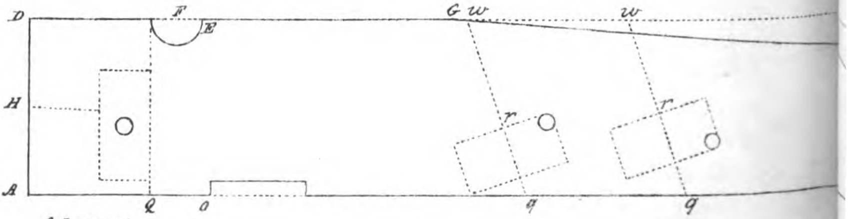


Fig. 1 for Guns



Art. Depôt

Plate 1.

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Artillery Carriages.

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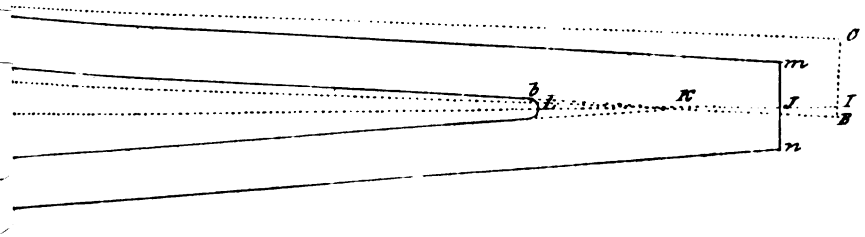
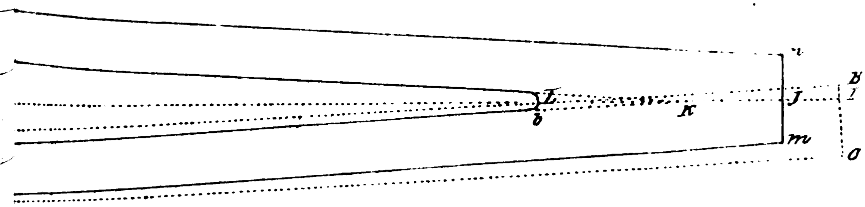


Guns.



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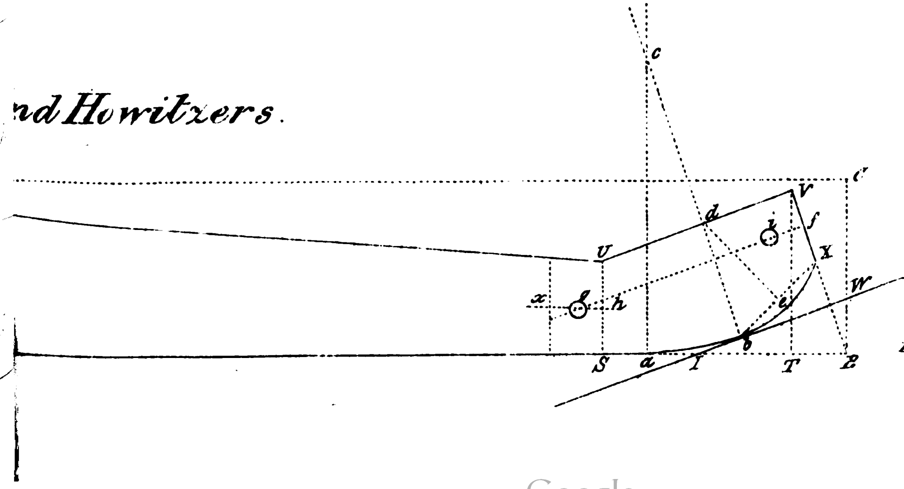

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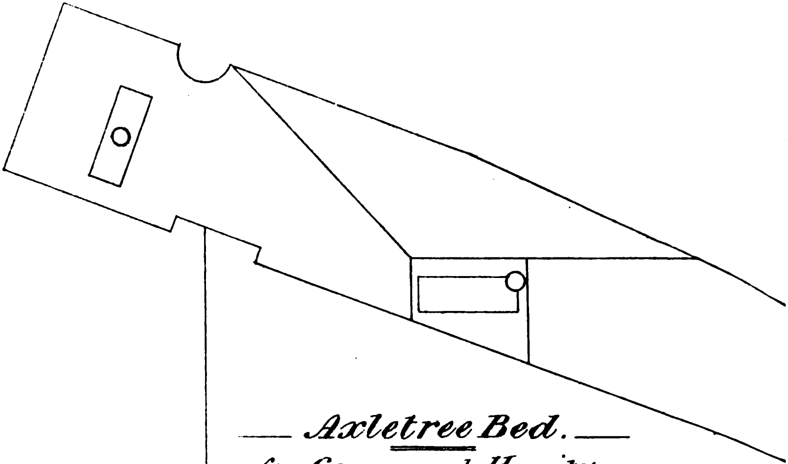
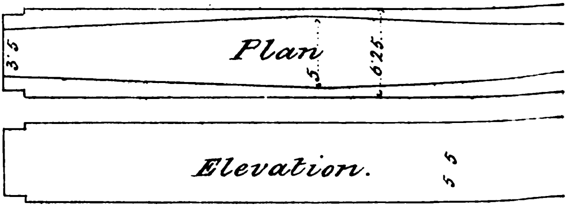
Inner view of Cheek.



Axletree Bed.
for Guns and Howitzers.



Art. Depôt.

Plate 2.

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Work

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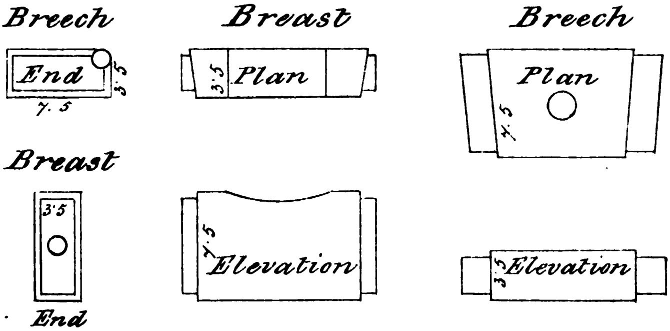
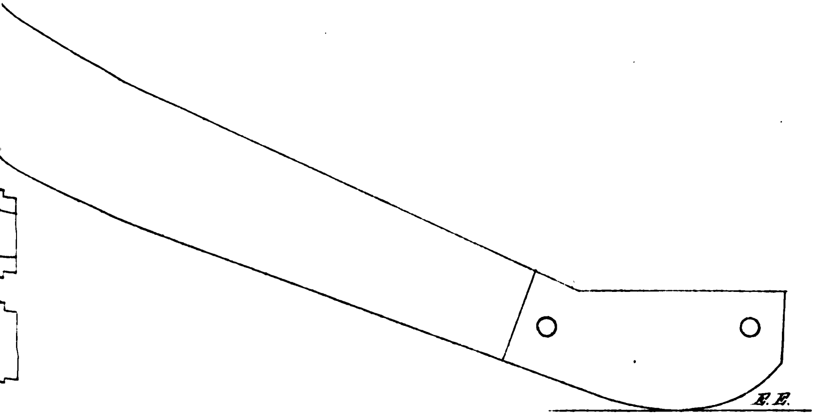
— Transoms. —





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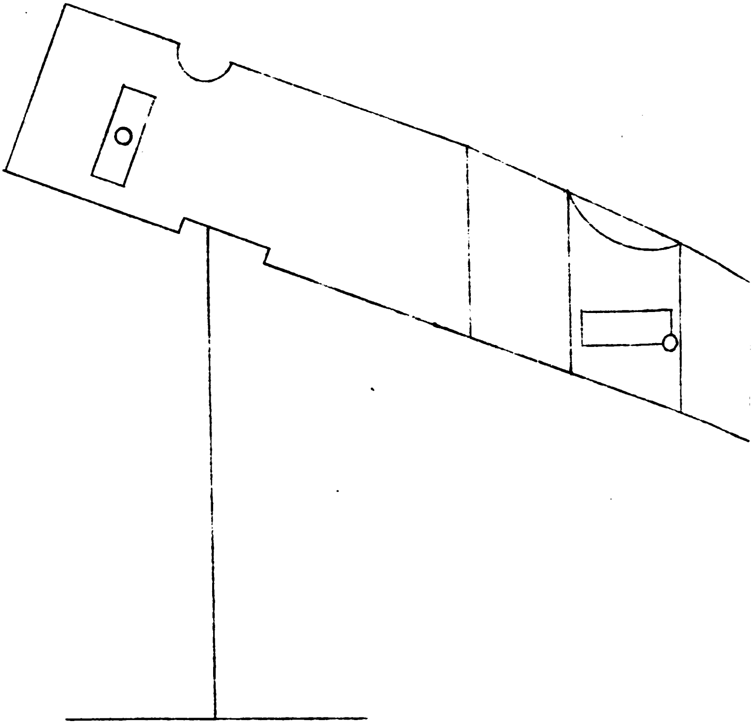

Plate 3.

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Work

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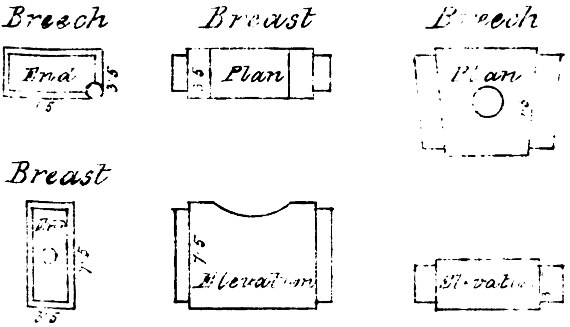
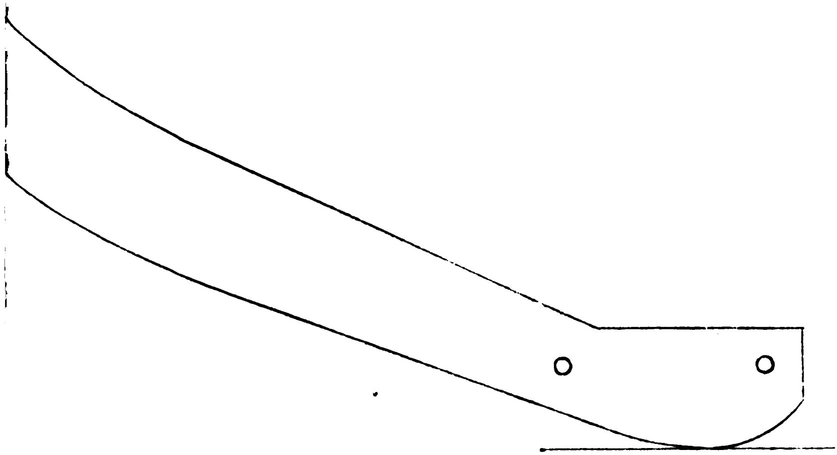
Transoms





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6 and 9 Pdr: Guns an

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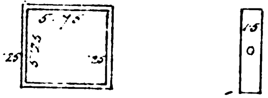
Outer



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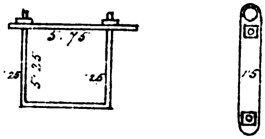
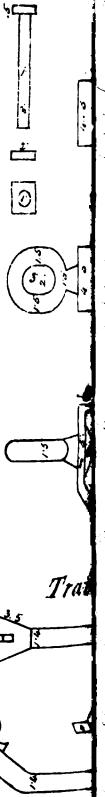
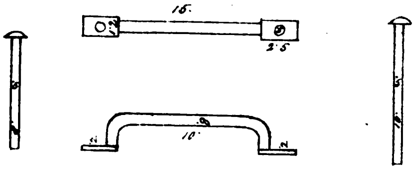




Trail Handle



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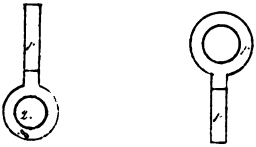

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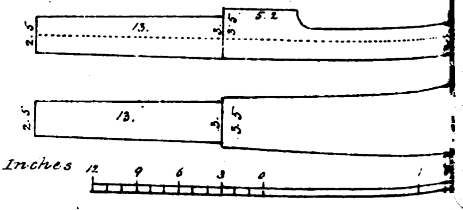


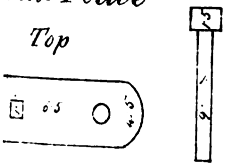
Artillery Officers.

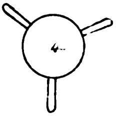
Plate 4.

Work
alike to the
12 and 24 Pdr: Howitzers.

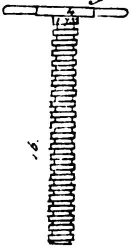
Trail Plate

Top





Elevating Screw



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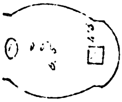
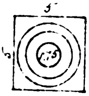
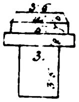
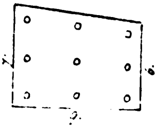


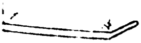


Brass Box



Friction Plate





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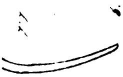
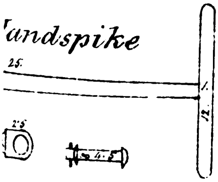
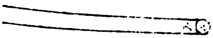
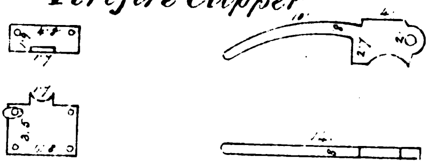


Handspike





Portfire Clipper



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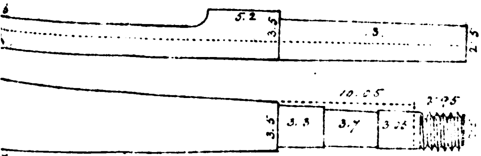

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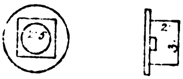

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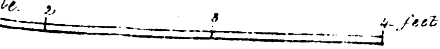

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24 Pdr. Howitzer.

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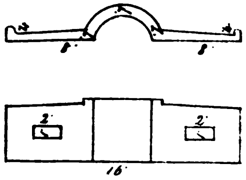
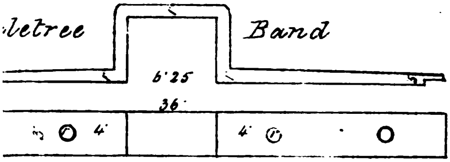
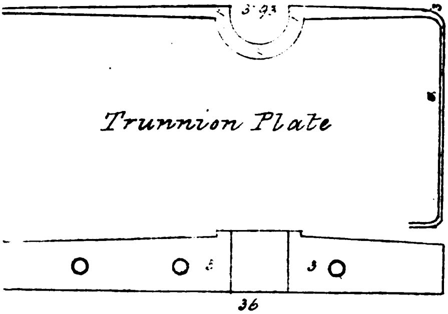
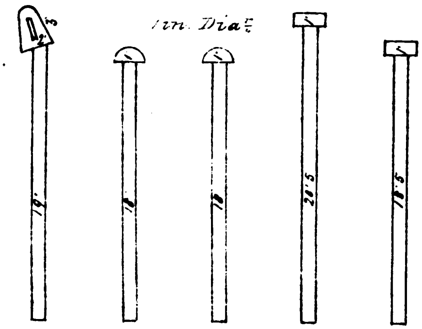




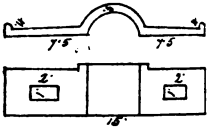


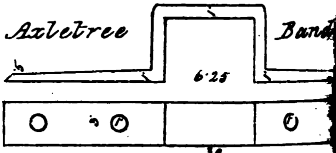
Garnish, and Transom Bolts

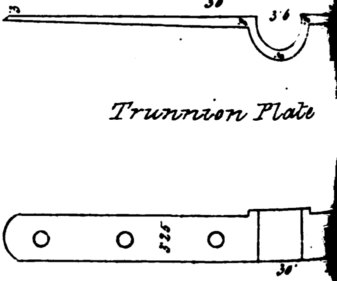


12 Pdr. Howitzer.

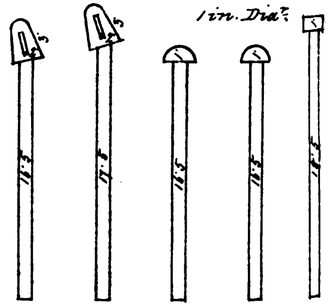
Capsquare







Eye, Garnish, and Transom



Artillery Officers.

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9 Pdr. Gun.

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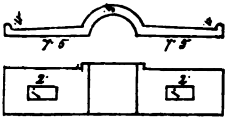
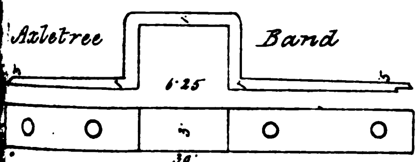
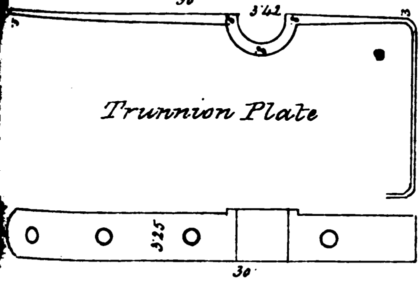


Axletree Band



Trunnion Plate



Eye, Garnish, and Transom Bolts.

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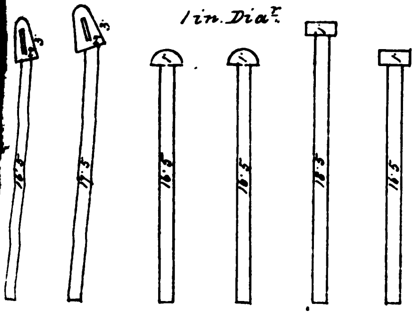

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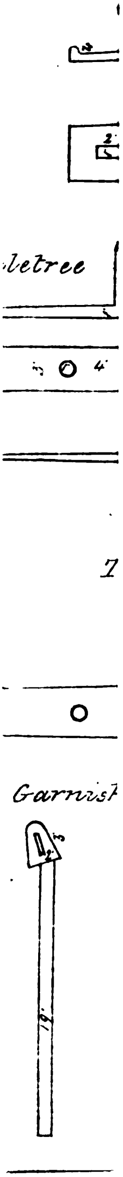

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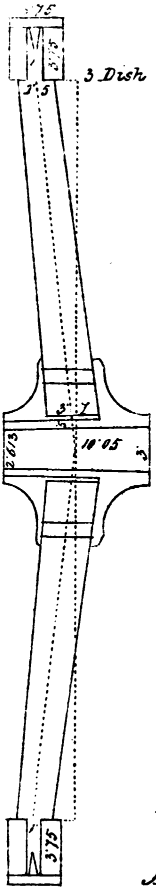

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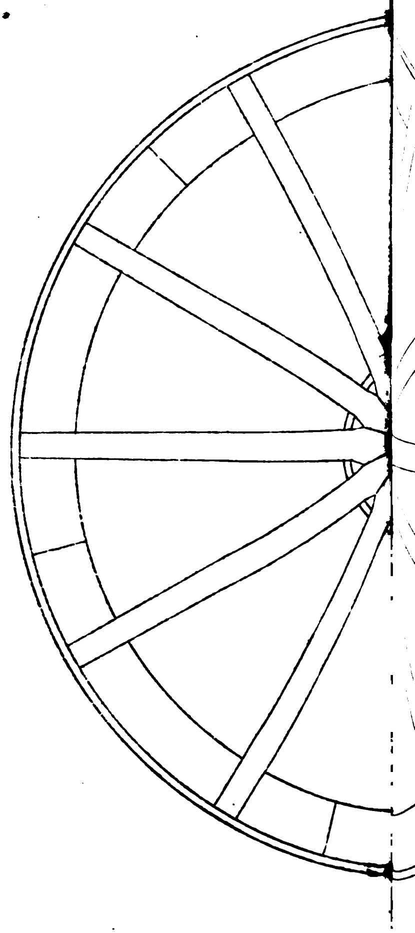

Plate 6.

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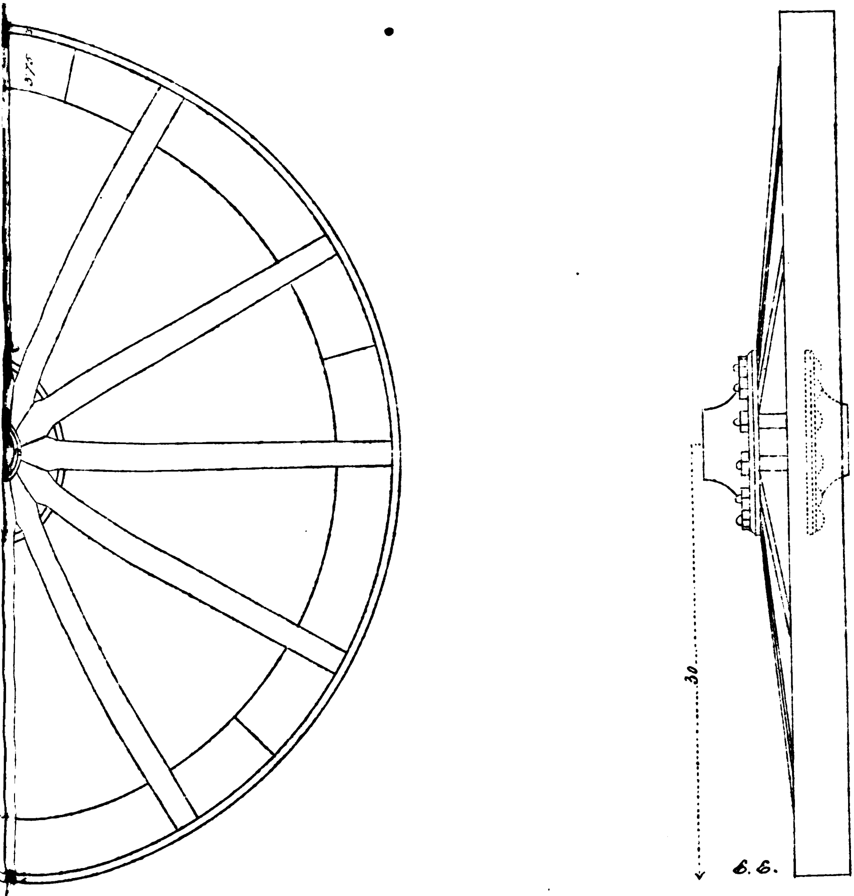

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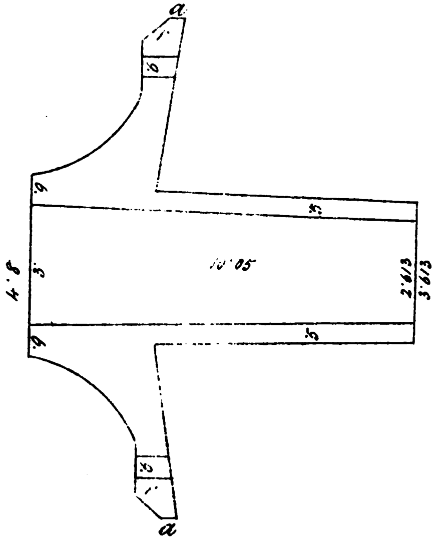

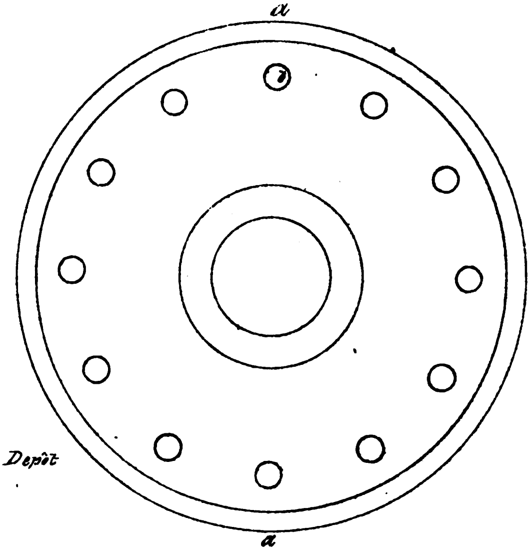

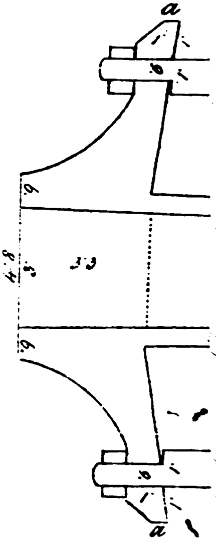

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Plate 7.

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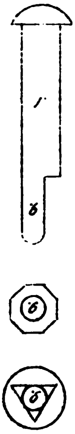

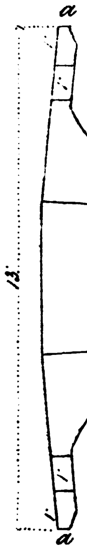

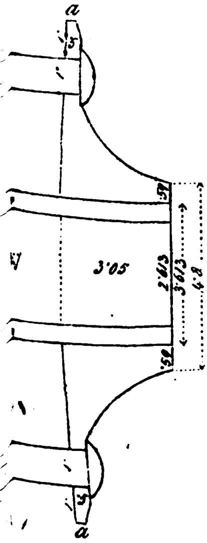

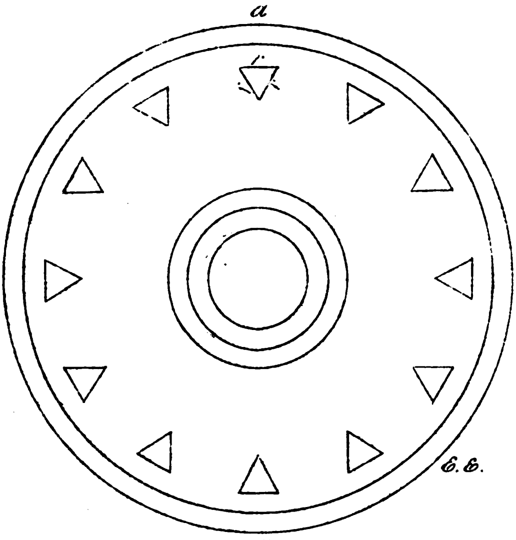

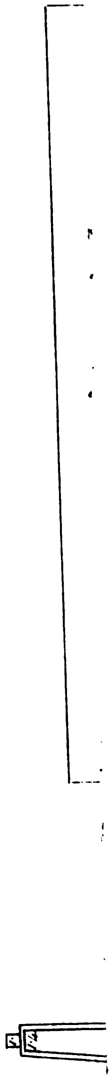
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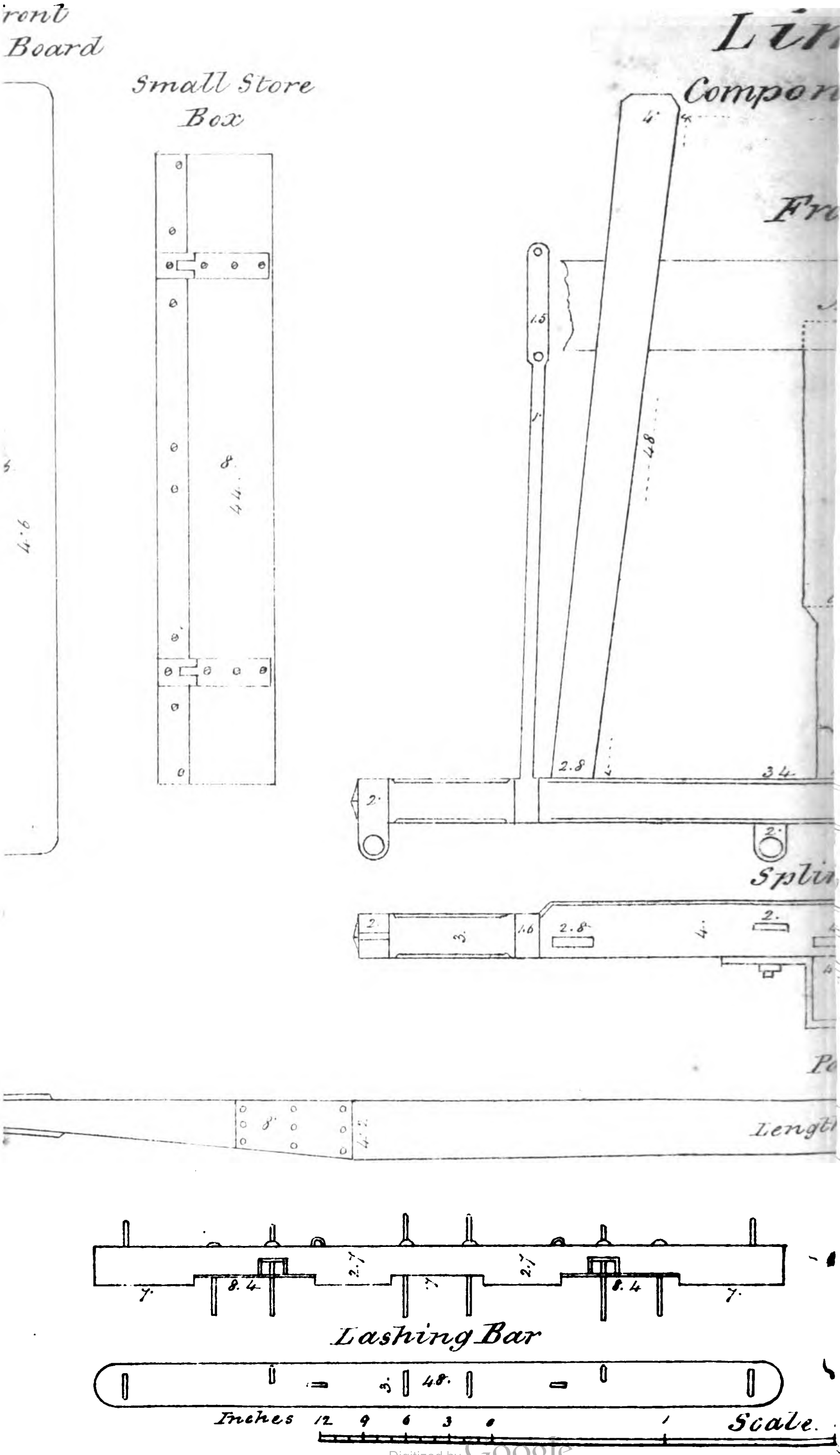
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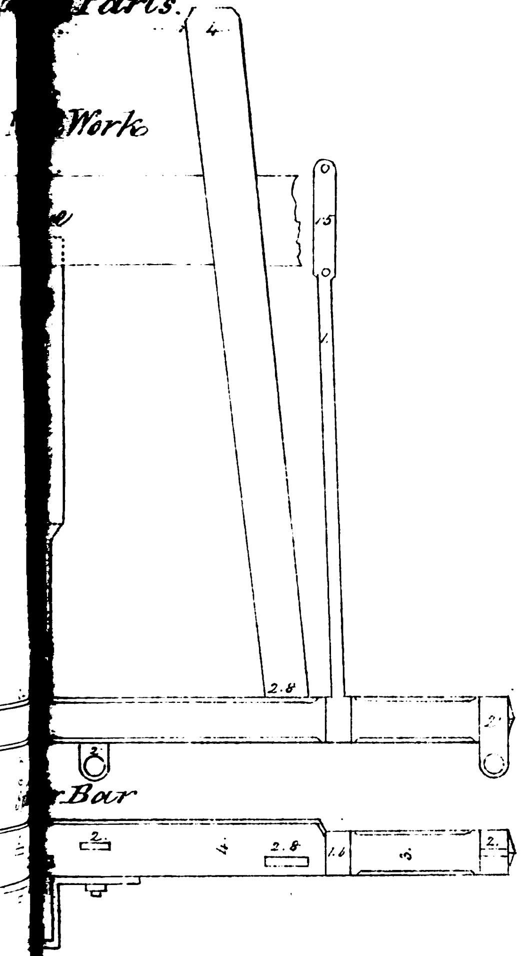
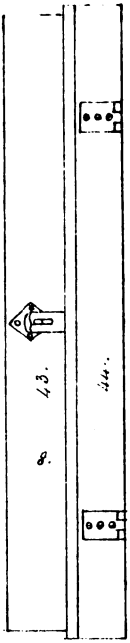
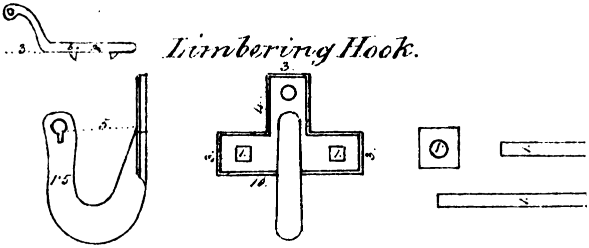
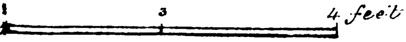


Small Store Box



Limbering Hook.





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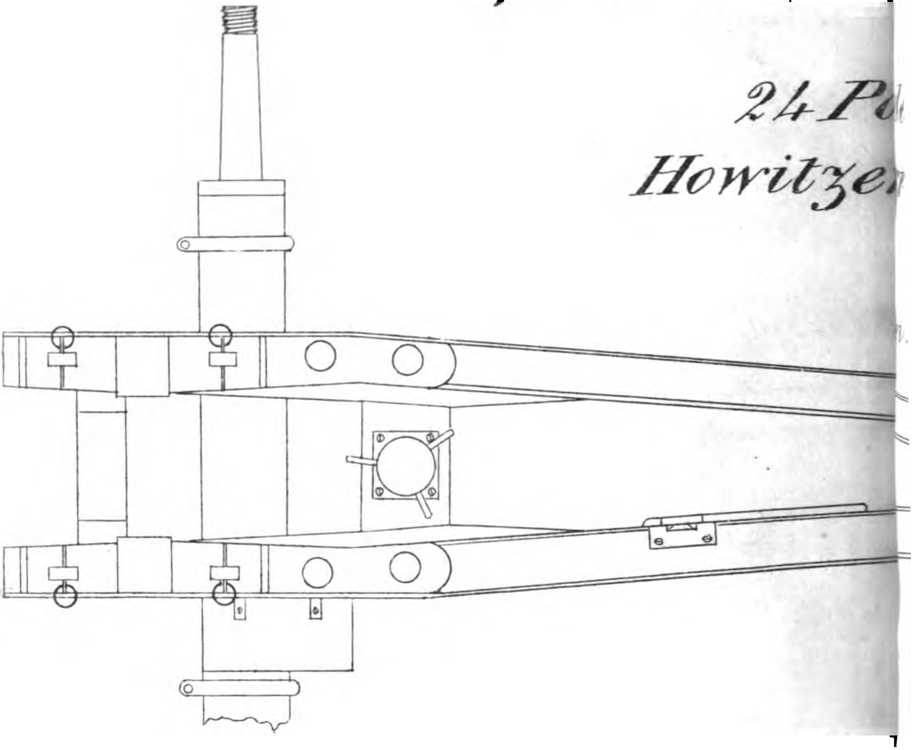

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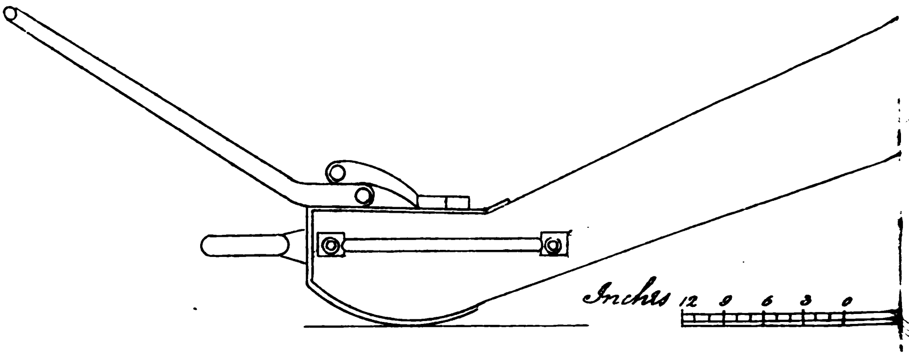

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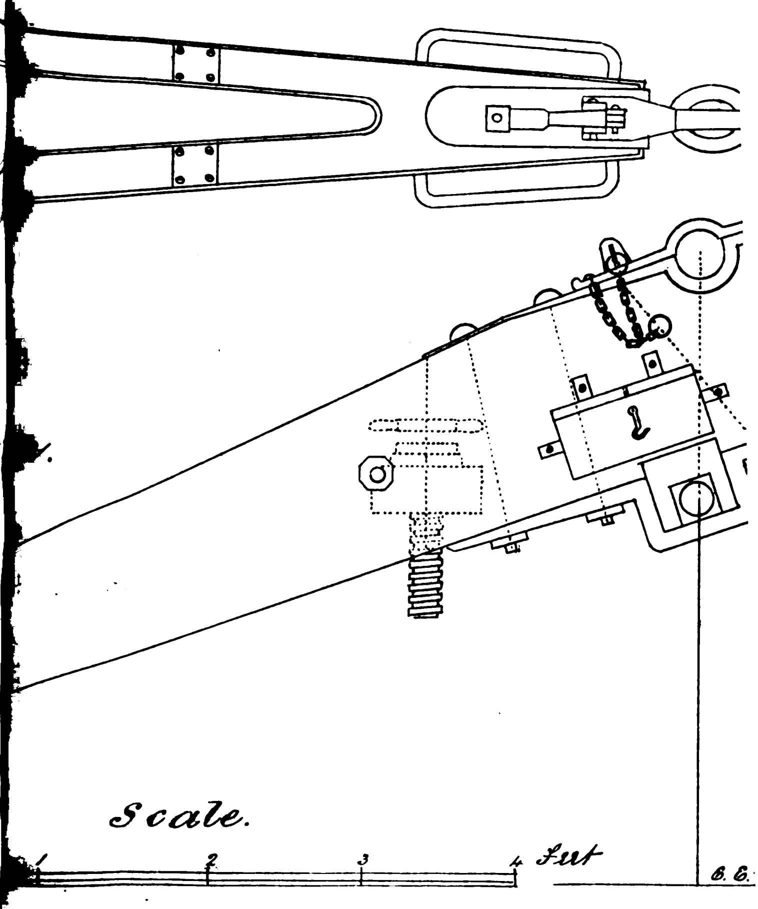

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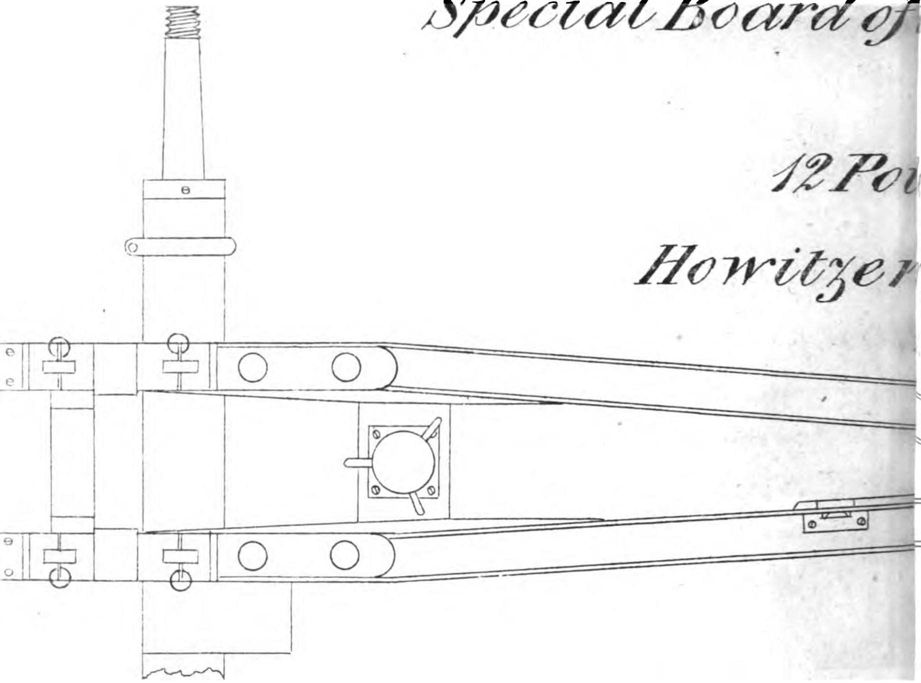

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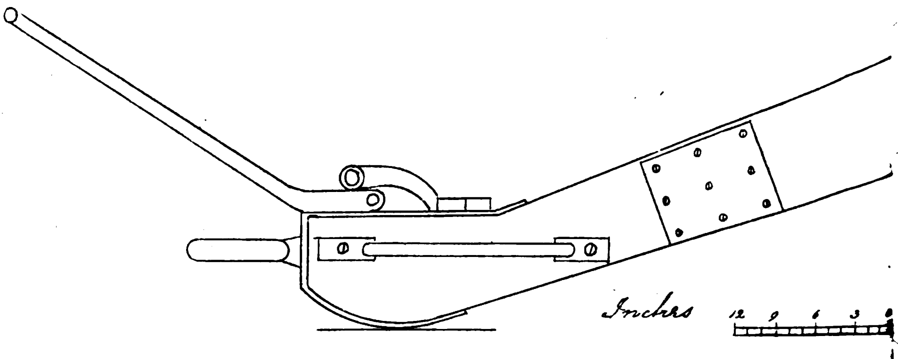

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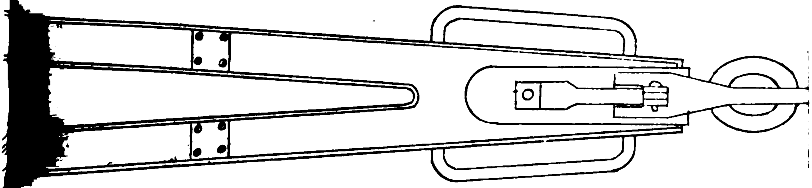

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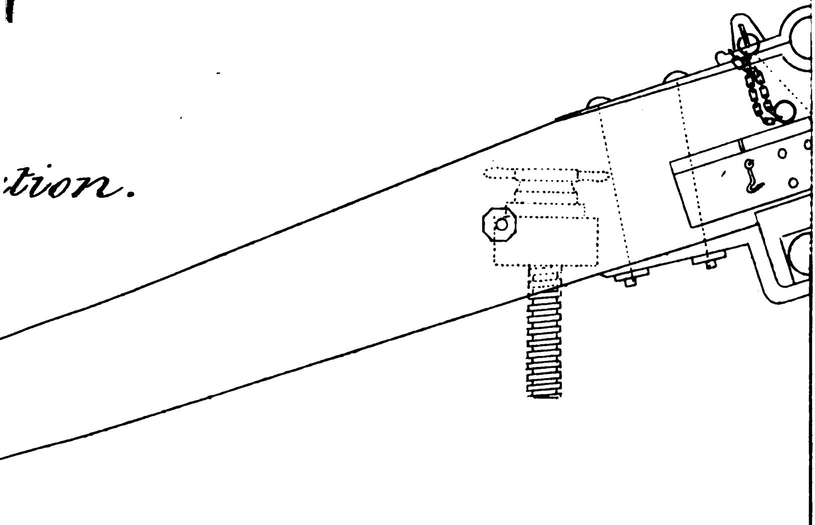

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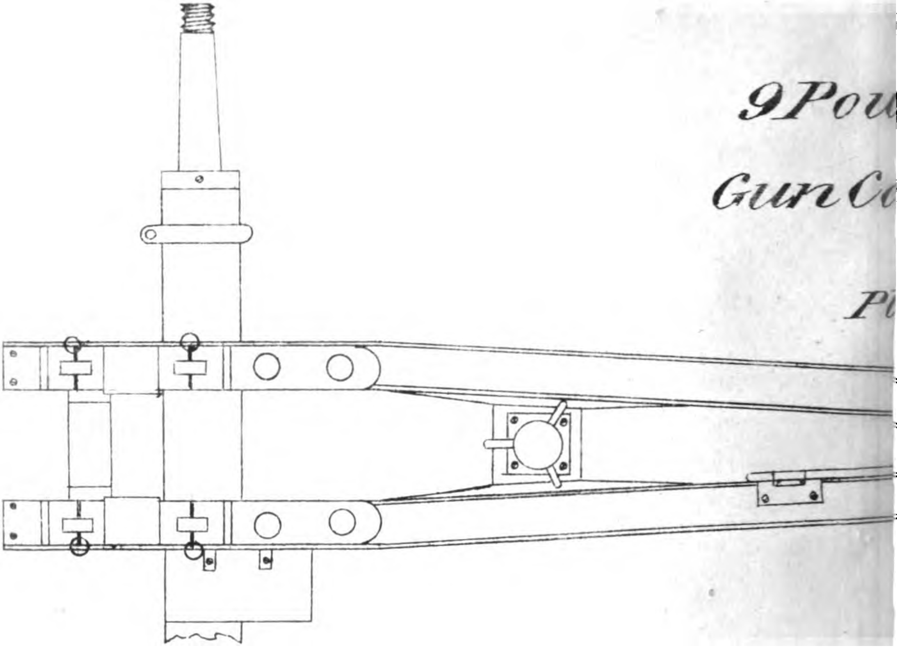

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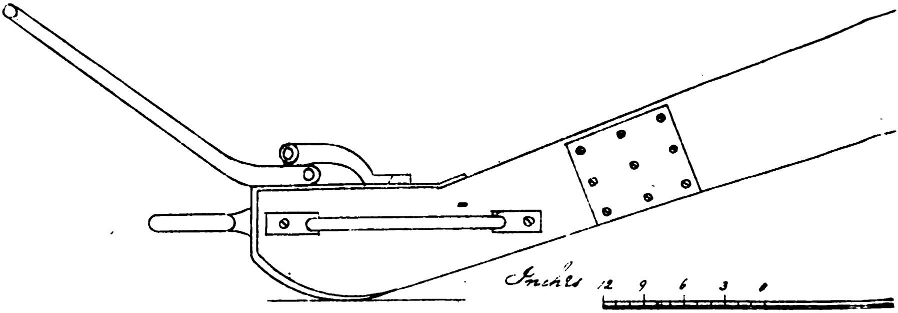

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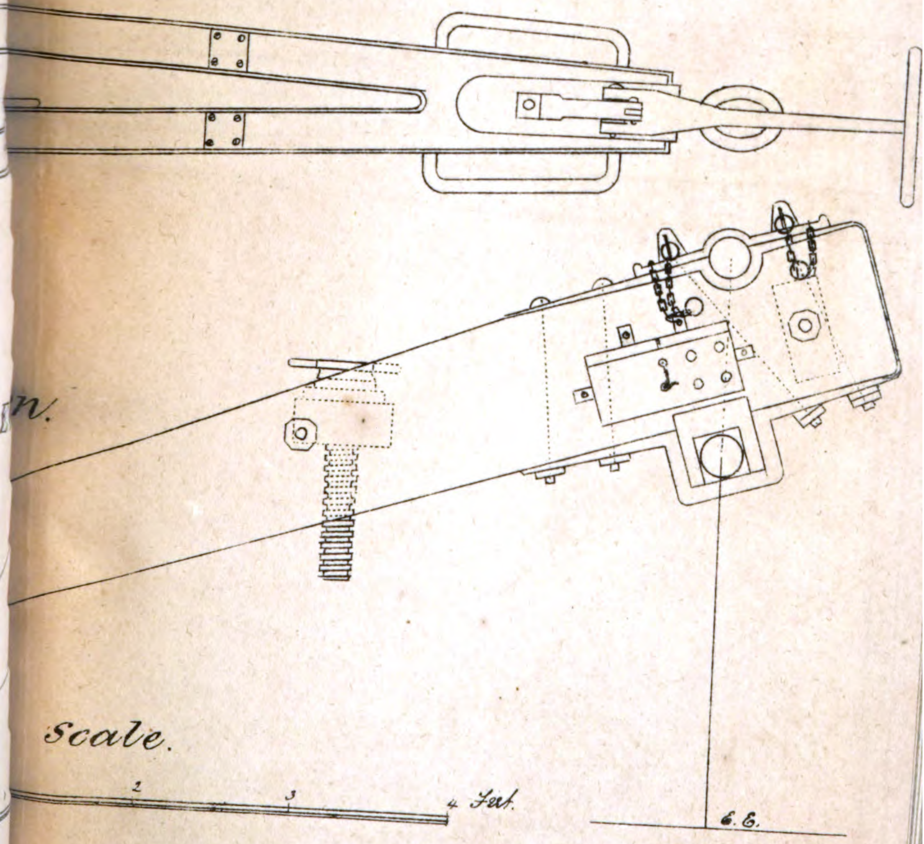

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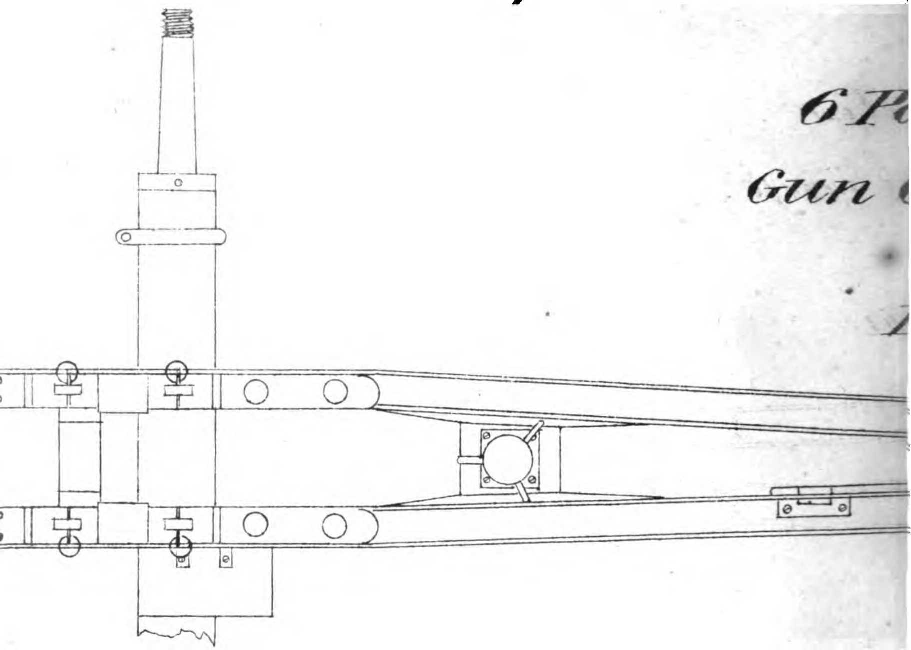

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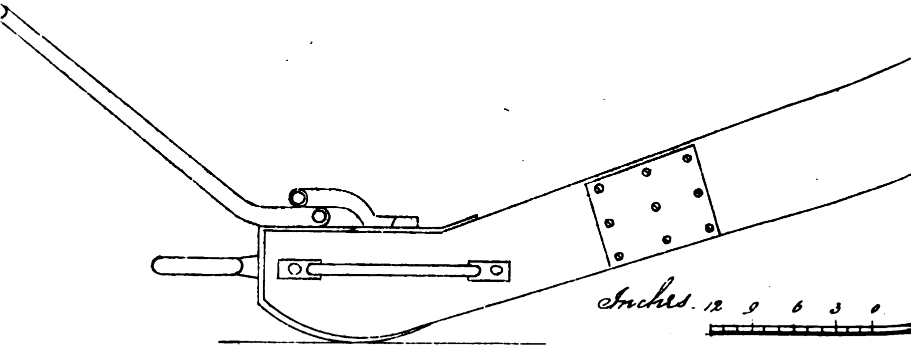

Plate 12.

Artillery Officers.

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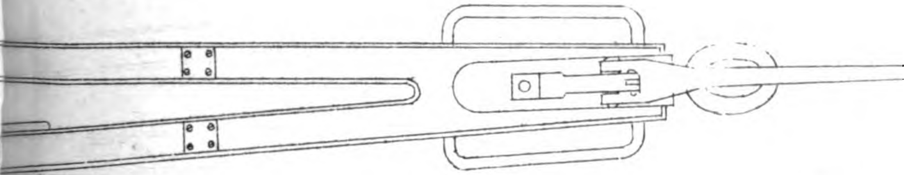

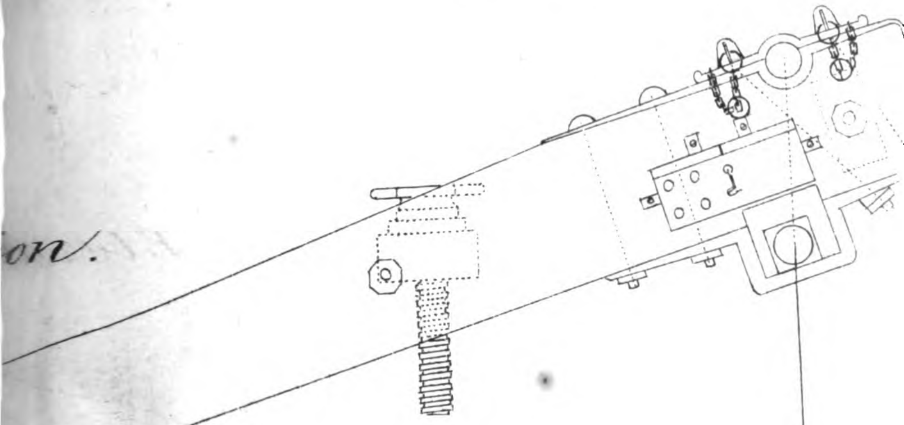

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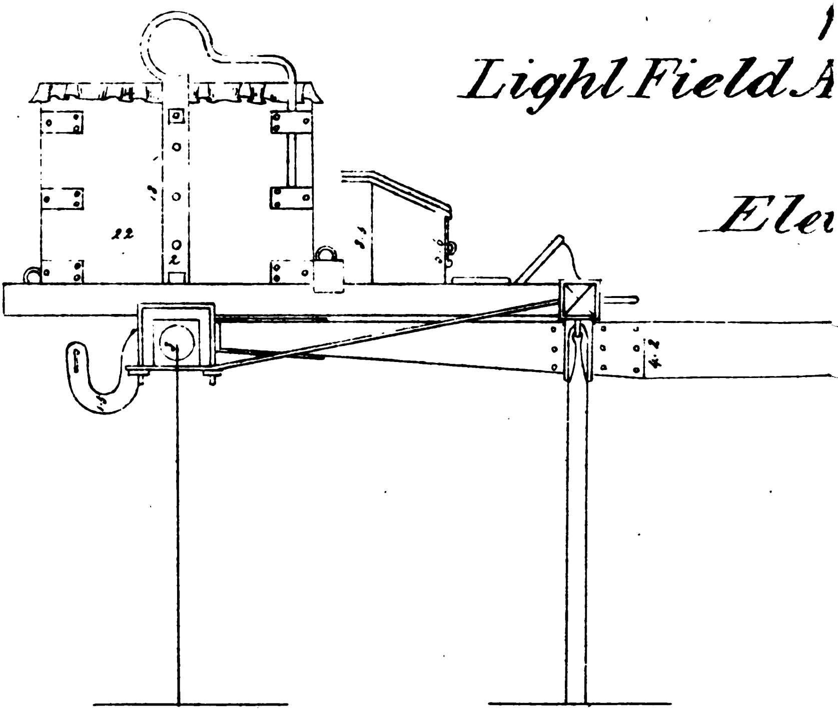

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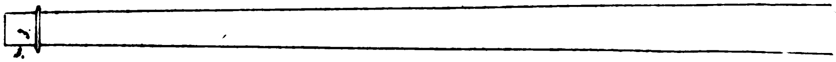

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Artillery Officers

Plate 13.

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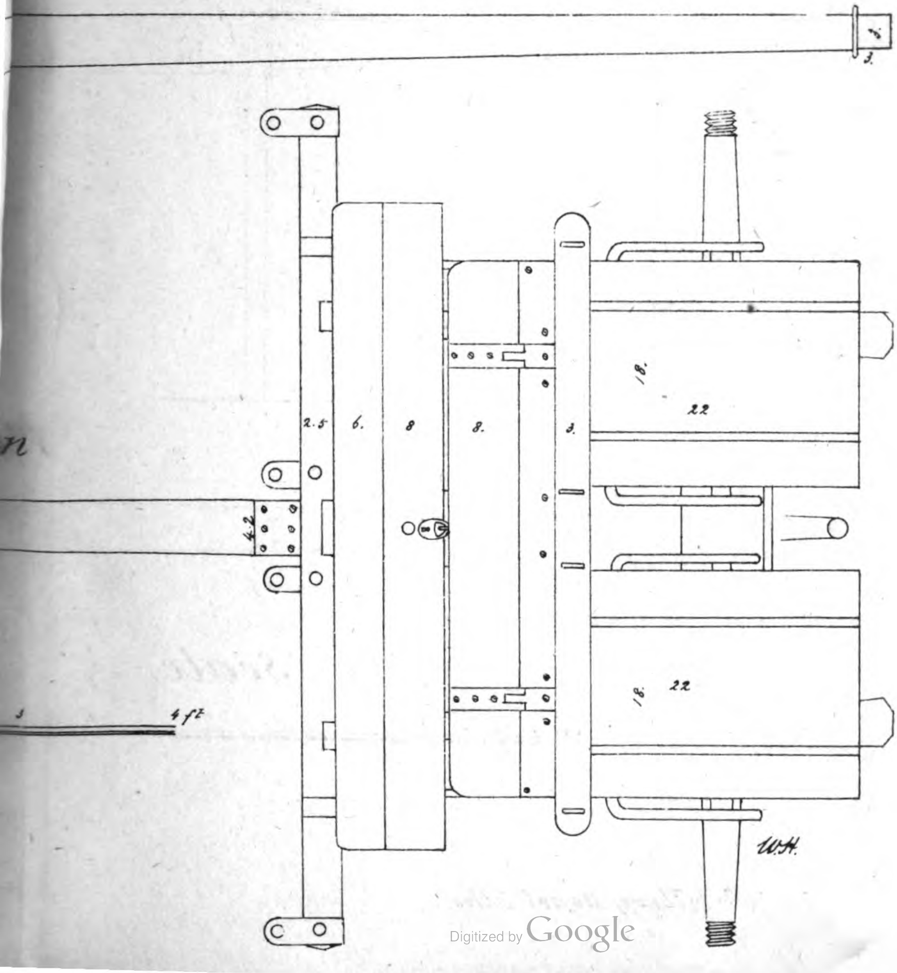

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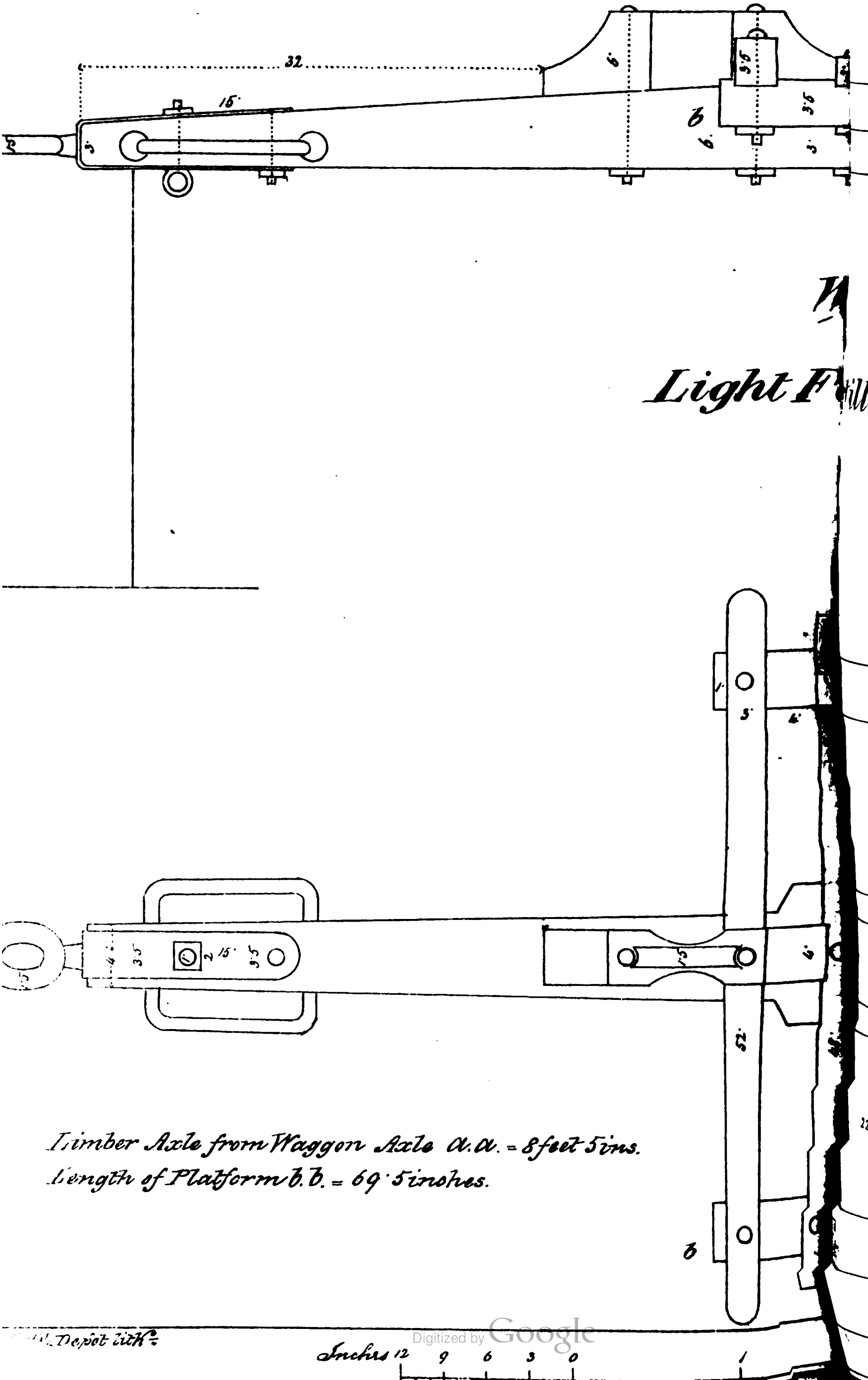

Limber Axle from Waggon Axle a.a. = 8 feet 5 ins.
Length of Platform b.b. = 69·5 inches.

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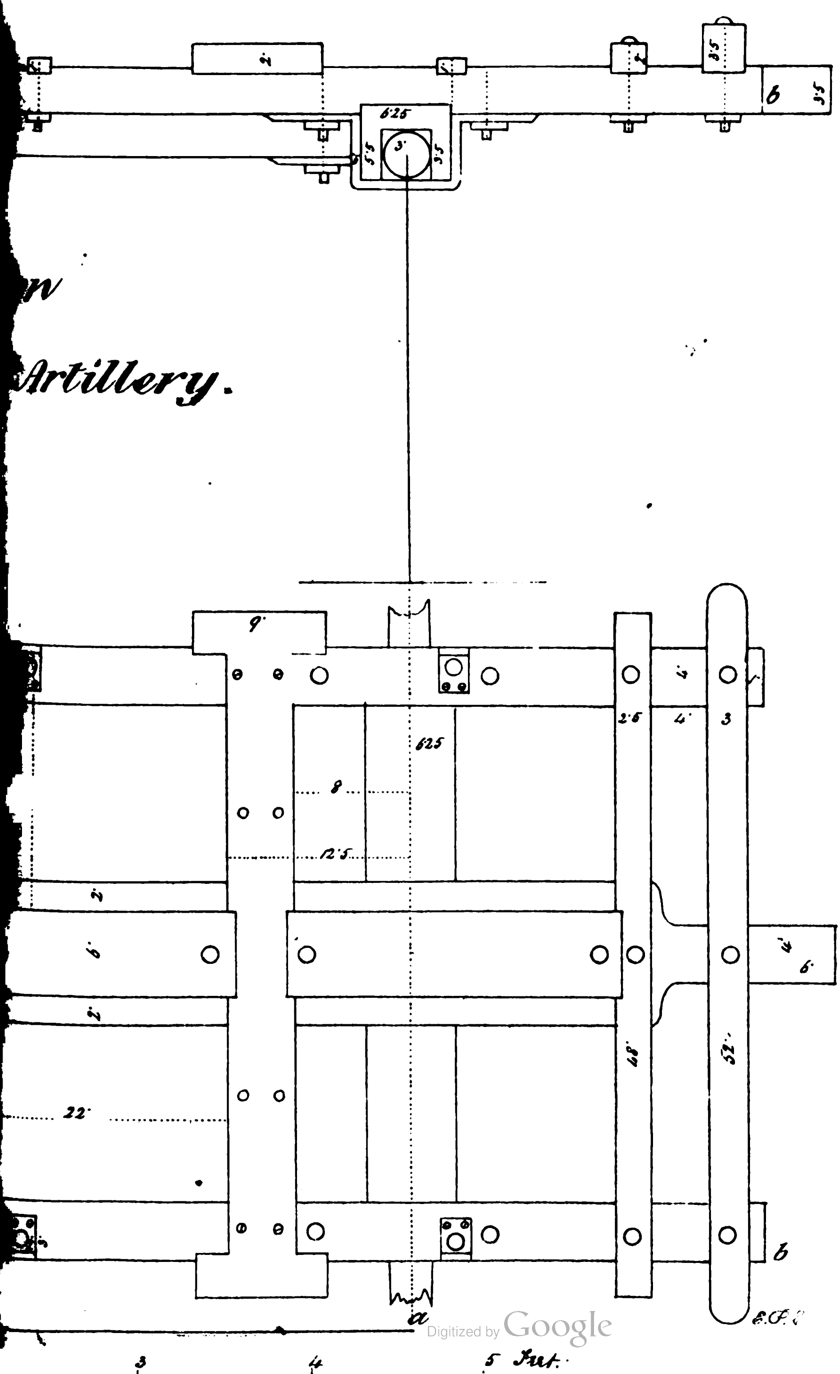
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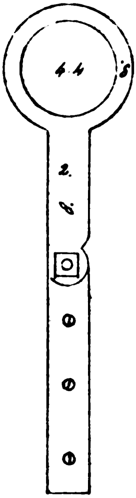

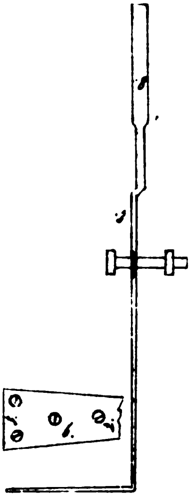

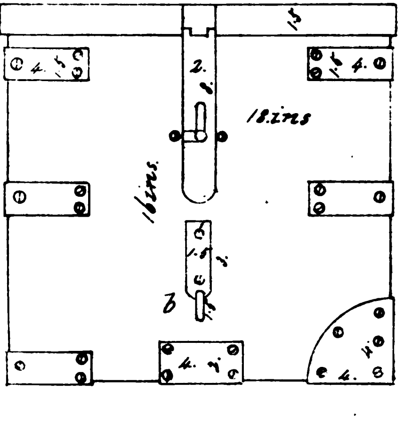

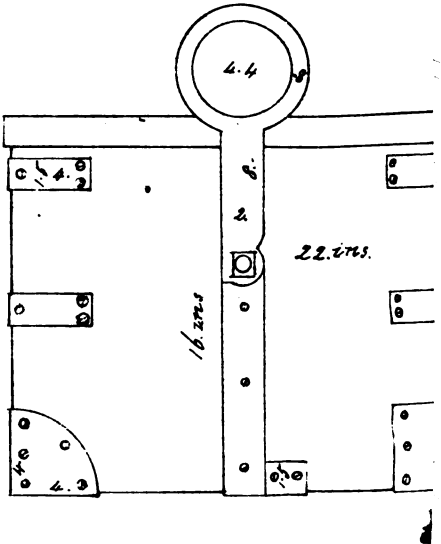

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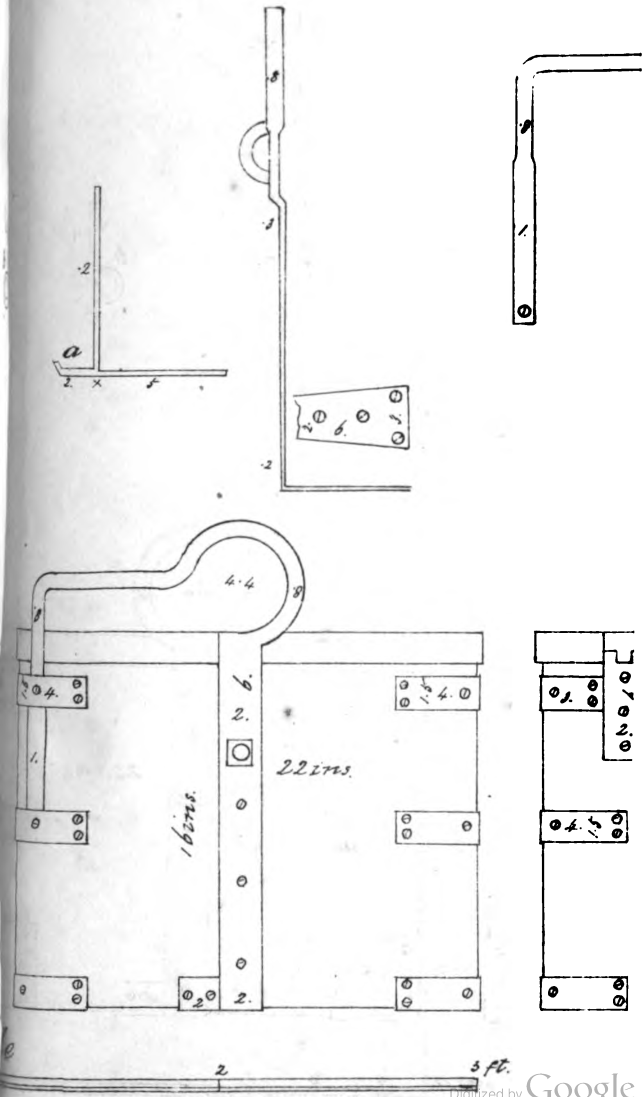
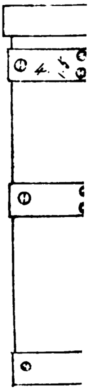




Special Board of Artillery Officers.

Sketches shewing the method of fixing the Spokes in brass and wooden Naves.

fig. 1.

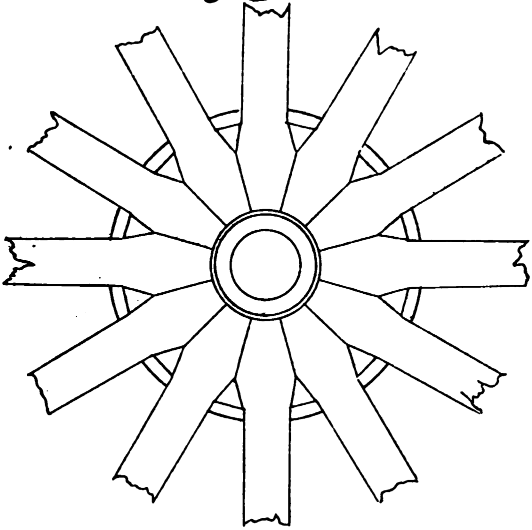
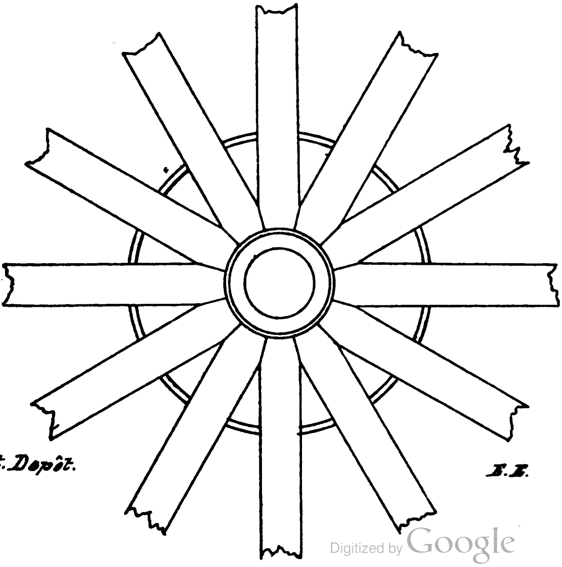


fig. 2.



Art. Depôt.

E. E.

the same size for field carriages of every description is manifest, they have adopted the heaviest wheel which is necessary for the two latter pieces, as their standard in this respect.

WAGGONS.

It has been found inconvenient to make the perch of the waggons moveable, as determined in the Board's former proceedings,* they have, therefore, resolved on having it fixed.

In conclusion, the Board having had the opportunity of constructing a 24 pounder howitzer and 9 pounder carriage, according to the dimensions they have here detailed, and to try them at Dum Dum, under the same circumstances as before described; annexed reports No. 19 and 23† of this experiment, and having at the same time submitted a Bengal 24 pdr. howitzer carriage, and the 13 cwt. 24 pounder howitzer English carriage to trials; their reports are included No. 20 and 21† in which it will be observed that the former completely failed in 10 rounds.

Report No. 22† is annexed, of experiments on the howitzer of 10 cwt. mounted on the carriage constructed by the Board. The 13 cwt. howitzer on the English beam carriage, and the 10 cwt. howitzer on its own Bengal carriage with service charges to compare the difference of recoil.

The Board are aware that the trials to which they have subjected these carriages are severe, but they have purposely done so, to remove all doubts of their capability, under every possible contingency, which has been in their opinion, more than dubious with the equipments now in use at all the three Presidencies.

(Signed) T. STEVENSON, Lieut. Col.
Bombay H. A. President.

J. TENNANT, Lieut. Col.
C. GRAHAM, Lieut. Col. H. A.
R. S. SETON, Captain H. A.
W. J. WHITLIE, Bt. Capt. H. A.

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* Page 11.

† Not given.

ABSTRACT STATEMENT shewing the number and nature of Gun Carriages proved by the Committee with the remarks appended to each Report.

Number.	Nature of Gun Carriage.	REMARKS.
1	Board of Artillery Officers, 12 Pdr. Howitzer Cheek Carriage.	Elevating screw not fixed to cascable. At 3 degrees elevation the wheels checked 8 rounds, by a block of wood 8 feet long, and 8 inches by 6; at 7 degrees 10 rounds, and at 10 degrees 5 rounds; the recoil was steady, and without much jumping—Trial ceased in consequence of rain.
2	Major Timbrell's 9 Pdr. Cheek Carriage.	Elevating screw fixed to the cascable. A crack observed in the right cheek, from the axletree half-way to centre transom bolt; centre transom split. The crack in right cheek extended to centre transom bolt; two screws of trunnion plate started, the axletree of this carriage was bent at the centre to the rear 1 inch.
3	24 Pdr. Howitzer Bombay Cheek Carriage.	Elevating screw not fixed to cascable; one spoke split, match-box broken, screws of trunnion plate and match-box hinge started, two spokes broken, broke across the cheeks and came down; the appearance of the wood, judging from its exterior, indicated it to be perfectly good and sound: but the fracture exhibited great decay in the centre.—The axletree of this carriage was bent at the centre to the rear ·5 inches.
4	24 Pdr. Howitzer Bengal Carriage (Capt. Timbrell's	33d Round axletree broke 15 Inches from shoulder, jumped a little in the recoil.

5	24 Pdr. Howitzer Bengal Beam Trail Carriage.	Elevating screw not fixed to cascable, screw of upper rear garnish plate started, wheels shaken where the spokes enter the naves: washer of near left cheek bolt turned, a crack in bottom of beam from elevating screw to axle-bed. Beam split from where it rests on axle-bed 12 inches; axle-bed split; has been twice perforated for elevating screws and has 6 bolt perforations at the elevating screw bed: cheek tabled; jumped a good deal in the recoil. The axle-tree of this carriage was bent at the centre to the rear 1 inch.
6	12 Pdr. Howitzer Bengal Beam Trail Carriage.	Very steady in the recoil, the axletree of this carriage was not bent.
7	9 Pdr. Gun Bengal Beam Trail Carriage.	Elevating screw fixed to the cascable; the axletree of this carriage was bent at the centre to the rear 1 inch.
8	6 Pdr. Gun. Bengal Beam Trail Carriage.	Elevating screw fixed to the cascable, the axletree of this carriage was not bent.
9	24 Pdr. Howitzer Madras Cheek Trail Carriage.	Elevating screw fixed to the cascable, 3d round washer dropped from elevating screw. 6th round axletree bed shook, 9th round axletree broke 13 inches from the shoulder and carriage came down.
10	12 Pdr. Howitzer Madras Cheek Trail Carriage.	Elevating screw not fixed to the cascable.
11	9 Pdr. Gun Madras Cheek Trail Carriage.	Elevating screw not fixed to the cascable. 13th round screws of match box started, 64th round spoke split. The axletree of this carriage was bent at the centre to the rear 1 inch.

Abstract Statement, &c. continued.

Number.	Nature of Gun Carriage.	REMARKS.
12	6 Pdr. Gun Madras Cheek Trail Carriage.	Elevating screw fixed to the cascable, 41st round right cheek split from the trail plate to 8 inches beyond the elevating screw bed, the split opening in the succeeding rounds. Jumped a good deal—the axletree of this carriage was bent at the centre to the rear 1 inch.
13	12 Pdr. Howitzer Bombay Cheek Trail Carriage.	Elevating screw not fixed to the cascable. Jumped a good deal, the axletree of this carriage was bent at the centre to the rear 1 inch.
14	6 Pdr. Gun Bombay Cheek Trail Carriage.	Elevating screw fixed to the cascable. 60th round bolt of elevating screw bed dropped off, but did not affect the carriage, the bolt with the nut off was found on the ground after the round was fired. The axletree of this carriage was bent at the centre to the rear 1 inch.
15	6 Pdr. Bombay (Sel, Com.) Cheek Trail Carriage.	Elevating screw fixed to the cascable, the right box band broken (shot box on the iron axletree) the axletree of this carriage was not bent.
16	24 Pdr. Howitzer (Sel, Com.) Bombay Cheek Trail Carriage.	Elevating screw not fixed to the cascable; 6th round cheeks split, and axletree broken under left band 3 inches from shoulder.

17	Board of Artillery Officers 12 Pdr. Howitzer Cheek Trail Carriage.	Recoil very steady without jumping, the left axletree band has frayed the bed.
18	6 Pdr. do. do.	Elevating screw fixed to the cascable—25 round left cheek band of the elevating screw bed broken.—In the recoil there was some jumping at 7°; at 10° a little more, at the highest still more, but at no time very great.—Iron axletree arm bent down half an inch.
19	24 Pdr. Howitzer do. do.	Elevating screw not fixed to the cascable—1st round front right eye bolt broken at the screw and above the nut, which nut was not properly fitted, front eye bolt removed —140th round near screw of match box started, 151st round front right eye bolt repaired and replaced—240th round rear right garnish bolt broken at the screw and above the nut while tightening with the wrench, the broken bolts indicate bad material. Breast transom bolt found broken at head on taking the carriage to pieces, the recoil was particularly steady throughout, the trail gliding smoothly along the ground without jumping.
20	Woolwich pattern 24 Pdr. Howitzer Beam Trail Carriage.	Elevating screw not fixed to the cascable.—The recoil admirably steady as might be expected when only the service charge of powder was used.
21	24 Pdr. Howitzer Bengal Beam Trail Carriage.	Elevating screw fixed to the cascable—9th round elevating screw bed bolt broken.—10th round carriage broke down the beam having given way close to the axletree —there was considerable action in this carriage, the trail bounding off the ground to a distance of 4 feet in the recoil.

Abstract Statement, &c. continued.

Number.	NATURE OF GUN CARRIAGE.	REMARKS.
22	Comparative proof of the 3 last mentioned Carriages, a fresh Bengal one replacing the one broken.	Recoil unsteady and action violent.
23	Board of Artillery Officers, 9 Pdr. Cheek Carriage.	Elevating screw not fixed to the cascable, the action of this carriage was remarkably steady throughout the different elevations and charges.
24	9 Pdr. Bengal Beam Trail Carriage.	Elevating screw fixed to cascable—jumped a good deal in the recoil.
25	Woolwich pattern 9 Pdr. Beam Trail Carriage.	Elevating screw fixed to cascable—jumped in the recoil, but not so much as the Bengal carriage.

Table shewing the weights of Gun and Howilzer Carriages, Limbers, Wheels &c. as weighed in the expense Magazine.—Dum Dum, 14*th February*, 1838.

Parts weighed.	Special Board of Artillery Officers.				Bombay.			Madras.				Captain Timbrell's.			Woolwich Pattern.		Bengal R. P.					
	12 Pdr. Howzr. Carriages	6 Pdr. Gun do	24 Pdr. Howzr. do	9 Pdr. Gun do	24 Pdr. Howzr. do	12 Pdr. Howzr. do	6 Pdr. Gun do	24 Pdr. Howzr. do	12 Pdr. Howzr. do	9 Pdr. Gun do	6 Pdr. Gun do	24 Pdr Howzr. do	9 Pdr Gun do	9 Pdr Cheek do	24 Pdr. Howzr. do	9 Pdr. Gun do	24 Pdr. Howzr. do	24 Pdr. Howzr. No. 9 do	12 Pdr. Howzr. do	9 Pdr. Gun do	6 Pdr. do do	9 Pdr. do do
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs	lbs.	lbs.	lbs.	lbs.
Carriages with Axletrees. ...	789	597	967	837	702	626	459	762	720	678	688	817	770	546	1008	802	870	855	778	817	708	848
Wheels....	580	583	574	566	682	544	542	532	542	534	528	491	491	491	412	532	491	456	491	491	491	464
Limber with Boxes, &c....	690	690	690	690	670	670	674	588	588	588	629	492	492	492	507	507	631	587	631	635	635	635
Wheels........	602	602	602	574	584	584	584	520	520	520	512	491	491	491	490	490	491	452	491	491	491	491
Total...	2661	2472	2833	2667	2638	2424	2259	2402	2370	2320	2357	2291	2244	2020	2417	2331	2483	2350	2391	2434	2325	2438
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
To raise the trail off the ground	186	187	265	258	174	147	174	252	187	210	184	258	259	188	250	243	243	252	266	249	224	270
Topoise the trail off the ground	175	172	244	244	145	119	154	110	165	203	157	217	231	172	206	210	215	226	252	240	212	251

MINUTE BY THE BENGAL MEMBERS.

The Bengal Members cannot allow the proceedings of the Board to draw to a conclusion, without entering on record that, from the experience they now have in constructing wheels with brass naves, and the knowledge thereby acquired, in the principles of their construction, they have been led to entertain great doubts of the propriety of generally introducing them into the service of that presidency, and they deem it necessary to record, for the information of the Supreme Government, their reasons for entertaining these doubts.

The Bengal Members must conclude from the best information they possess on the subject; that the variation of climate from dry to moist in the different parts of the Bengal presidency, and even the variation of climate in the same part at different seasons, are much more extended in their influence, than within the presidencies of Madras and Bombay; at least their own experience brings to their recollection, effects of climate in different parts of Bengal, much more severe on their carriages than appears even to be experienced at either of the other presidencies; and it is on record in the proceedings of the Bengal Select Committee, by their late Gun Carriage Agent, Major Fulton, that the influence of the dry winds and hot weather in the upper provinces is so great, as not to be reconciled with any thing of the same kind recorded in the other presidencies. The Bengal Members therefore, conceive that they may fairly reckon meeting with objections to the wheels now proposed, that have never been discovered or contemplated in the experiences of Madras and Bombay, and which cannot be elicited by any experiments they can institute at present.

These objections they conceive, are likely to arise from the nature of the materials with which the new wheels are constructed, in which the naves being of metal, and proof in a great degree against the effects of variations in the climate, while the spokes and felloes are of wood, and fully susceptible of such effects in the highest degree, must by this difference, produce much more serious consequences, than when the whole being of wood partakes throughout of the expansions and contractions produced thereby; and yet it is an ascertained fact that wheels made in the rains in the upper provinces (or made in Bengal proper, at any seasons, when sent to the upper provinces) are rendered almost useless in the dry weather and hot winds, from the excessive shrinking of the wood ; with different materials for the naves, the Bengal Members are disposed to think, that the whole machine would, under like circumstances, become disjointed and rendered unserviceable with a much more moderate variation of climate, and that the same degree of shrinking in the wood work, which would only render a wheel of the present construction repairable, and leave it capable of being set up with the original materials, would, with brass naves make it necessary to replace a considerable portion of the wood work.

As far as the Bengal Members have been able to discover, no practical facility is afforded by the construction of the Madras wheel either in repairs or setting up. The same operations are required, whether to replace unserviceable spokes and felloes, or to set up the wheel in both constructions. It has indeed been urged, that new spokes cannot be substituted in old wooden naves, but this is a mistake, for a wooden nave may wear out, several set of spokes, provided proper care is used in removing the old ones ; a new nave cannot indeed be fitted to an old set of spokes with great accuracy, but theBengal Members observe that wooden naves are so seldom worn out before the felloes and spokes, become unserviceable, that they in the course of 30 years in which they have both served, cannot bring to remembrance an instance of a wheel being condemned by competent authority from defective naves only, instances have been known of unprofessional committees condemning naves when split, as being thereby rendered unserviceable, and it is sometimes urged as a disadvantage of a wooden nave, that this is often necessary, but it has been proved in Bengal that a nave, even when split into 3 or 4 separate pieces performs its part well, so long as the nave bands stand and are firmly attached to it, nay, it has been satisfactorily established, that a wooden nave may be made sufficiently strong for our largest carriages when originally composed of 3 or 4 sound pieces of wood if the bands are perfectly fitted to it, and one object in adapting the present barrel shape of the Bengal nave was, the facility it afforded of tightening the bands, by a simple operation like hooping a barrel. An advantage of a wooden nave over a brass nave cannot be overlooked, viz. the means of replacing a box when it is worn out, and as the boxes of both are the same size, and subject to at least equal friction, this must be expected to happen to both, but in a wooden nave this change is effected with ease, without altering in any way the rest of the construction of the wheel, whereas in the proposed nave, the whole must be re-cast, and the wheels must be taken to pieces, and even were the box of a metal nave, made as they are at Bombay to shift, this latter operation would be necessary.

Under all these considerations, the Bengal Members cannot but entertain the greatest doubts whether any advantages are to be obtained in that presidency, from the introduction of metal naves, for there has never been any difficulty in procuring abundant supplies of wooden ones, at a cost of about $\frac{1}{3}$th of the brass naves, including the value of the box.

A Transport Carriage nave costs Rs.	8	0	0
Box	20	1	9
Rupees	28	1	9

A brass nave and box complete, will cost about 80 Rupees for a field piece.

A field piece wooden nave costs Rupees	4	8	0
A box for do. do. do.	12	0	0
Rupees	16	8	0

The Bengal Members therefore, though they have no apprehension of the strength, and foresee no difficulty in the substitution of brass for wooden naves, should Government think it necessary, in furtherance of the objects contemplated in forming the Board; conceive it their duty to record their opinion that it may be attended in that presidency with great inconvenience and expense. The former object they consider to be that more immediately liable to their observation, which if at all commensurate to their present ideas on the subject, would in their judgment become an insuperable objection to the introduction of the change, and they therefore suggest that the earliest opportunity may be taken, of sending some of the original wheels, as received from Madras and Bombay to Major Lumsden at Futteghur, that their state on arrival there, and after being subjected to the influence of the hot winds may be carefully ascertained.

The Bengal Members however, observe that the axletree arm must be made longer than has been proposed by the Board if wooden naves were retained, and as fully as long as the axletree arms of the present Bengal axletree, but the body of the axletree need not be altered.

GOVERNMENT HOUSE,
FORT WILLIAM,
27th January, 1838.

(Signed) P. TENNANT, Lt. Col.
„ C. GRAHAM, Lt. Col. H. A.

MINUTE BY CAPTAIN SETON, MADRAS HORSE ARTILLERY.

The Bengal Members having considered it incumbent on them, to record their apprehensions in respect of the suitableness of brass naves to a particular climate in India; I consider it right that I should briefly state the result of my own experience with wheels on this construction, and which reaches back to the year 1816, when I first joined the mounted branch of the Madras Artillery, During the whole interval between that period and the present time, this mode has been in constant and exclusive use with the Madras Horse Artillery, and I have had the most ample opportunity of bearing witness to its perfect efficiency under every species of trial, as well as those arising from having to travel at times over the worst description of roads, as from exposure under every variety of circumstances, and seasons; and to all climates existing between the Carnatic and Mysore, on the one side, and the Northern portion of Malwah on the other.

I can most unhesitatingly affirm, that I have never myself experienced any defect or inconvenience in wheels so constructed;

nor have I ever heard of any having been at any time ascribed to them in the experience of others.

That their efficiency attracted notice at a very early period, may be gathered from the following extract from a letter dated Poonah 24th April 1803, from the Duke of Wellington to Lieut. Genl. Stuart. " There is not a serviceable wheel in the whole " detachment, excepting those in Capt. Scott's form, 6 pounder " carriages and tumbrils."

The above was written immediately after a long and rapid march and the peculiarity of the construction referred to, is that which has been in use with Madras and Bombay Horse Artillery, and the general introduction of which has been now recommended by our Board.

No valid objections can be made to the brass naves on the mere score of expense, for on any estimate that can be formed, the difference of cost between them and those made of wood, is far too trifling to admit of being viewed as of any importance in a matter so essentially involving efficiency.

But I apprehend that a reference to records, will not shew that the Madras Carriages are disproportionately expensive, but rather the reverse.

The whole outlay for brass in the construction of a Horse Artillery 6 pdr. and limber at Madras, including of course metal for the naves of 4 wheels is Rupees 111-9-8.

No difficulty whatever is experienced in casting these naves there, and certainly none need be anticipated on the Bengal side, with the means afforded by the foundry at hand.

As these naves are not in use in England, and as the expediency of adopting them in Bengal has now been questioned, my main object in making this record, is to remove any misapprehension that might arise as to their being of recent introduction in other parts of India ; and of our having recommended for adoption in this instance, what may not have had its general fitness and efficiency guaranteed by sufficiently extended experience.

CALCUTTA, (Signed.) R. S. SETON, Captain,
March 5th 1838. *Madras Horse Artillery.*

MINUTE BY THE BOMBAY MEMBERS.

Our Bengal colleagues having recorded in a Minute appended to these proceedings, that from the experience they have now had in constructing wheels with brass naves, and the knowledge thereby acquired of their construction, they have been led to entertain great doubts of the propriety of generally introducing them into the service of the Bengal presidency, and assigning their reason for entertaining such doubts ; it becomes our duty to record the opinion we have formed in the course of our long experience with metal nave wheels ; of the advantage, which they possess over wheels with wooden naves, and our reasons for advocating their adoption for Artillery Field Carriages in India ; premising however, that the retention of different descriptions of wheels and axletrees under different presidencies would render nugatory one of the most essential objects for which this Board has been called together, as in our opinion, there are no parts of Artillery equipments (the Ordnance being all alike) which requires a more rigid adherence to uniformity than wheels and axles.

The first objection made to brass nave wheels is the difficulty of construction. This we conceive may be answered by the fact, that no difficulty has ever been experienced on this point, during a long period of 30 years that metal naves have been in use at the sister presidencies of Madras and Bombay. We must here remark, that the cutting of the tenon of spokes, and the mortices in wooden naves for their reception, is deemed by wheel-wrights in England a work of considerable art, because the tenons in the nave depend wholly for their firmness, to accurate workmanship. In this view, we conceive that with regard to simplicity and facility of construction, the metal nave wheels will be found to possess decided advantages, over those with wooden naves.

It is considered by our Bengal colleagues, that if the naves be of metal, and the spokes and felloes of wood, all not being liable to equal expansion and contraction by variations of climate, a wheel so constructed, would soon become disjointed. On this point we beg to refer to the annexed drawing Plate 16, for a comparative view of different forms given, and modes of fitting the spokes to the naves to the two descriptions of wheels. It will be observed, that with metal nave plates the spokes are radii to the periphery of the wheel, conveying to and filling up the entire space between the nave plates.

The spokes being uniform in figure, form a complete arch, whereby they firmly support each other at this part, and give stability to the whole of the wheel. From the figure given to the spokes, used with metal nave plates, Fig. 1, they can at all times be restrained in this part in the most perfect order, the base being of greater breadth than at the shoulder, they cannot be drawn upwards from the nave plates by any contraction of the felloes in their depth, and the triangular bolts, serve also to connect the plates and spokes firmly together, hence the construction at this part affords greater solidity than in a wheel with wooden nave, the thickness of the spokes between the nave plates, answering more effectually the purpose of solidity and unity, than can possibly be acquired by their insertion in separate mortices, in a wooden nave; for in the latter description of wheel, unity of the wheel soon becomes destroyed by the shrinking of the two parts, the felloes and the naves in dry climates.

If the spokes used with brass naves, shrink in their breadths, sheet lead or common country leather may be interposed between them and the nave plates, and if the shrinking should be in their thickness, pieces of wood corresponding in the dimensions with the openings between them, may be driven in, the triangular bolts will retain these pieces in their places, and by tightening the nuts of the belts the wheels may at all times be kept as firm at the nave, as on the first day of construction.

Now if we compare a wheel as constructed by the Board, with one as made in Bengal with a wooden nave, Fig. 2, it will be seen that when the nave shrinks in its diameter, and the felloe in its depth, each of these parts, by the contraction of their fibres towards their centres, cause a separation of the composed parts, the felloes, spoke and nave, and a disorganization of the wheel leading to their destruction must follow. It has been remarked that the greatest accuracy is required in filling the tenons of the spokes of the mortices of the naves, now the figure given by artisans to the spokes at the naves, and to drive it home, and to enable them to give firmness to the wheel when first made, is the very one that affords the least hold to resist their separation when the felloes and naves shrink. The form of the spokes being that of a wedge tapering to the interior of the nave, as the drawing force tending to a separation of these parts, is exerted in a greater degree at the felloe than at the nave, in consequence of the spoke being wedged into the felloe, it must follow, that the disorganization of a wheel, with a wooden nave commences with the latter part, and it will be seen from the mode of their being fitted to each other, that when this takes place, the only remedy available, is that of lessening the diameter of the tire, and re-tiring the wheel, an operation which only need be resorted to with metal nave wheels when the felloes shrink from the tire, and which must also be followed under similar circumstances with wooden naves, for it has been shewn, that the spokes may at all times be retained in perfect order between the metal nave plates of wheels so constructed.

It is on record that the shrinkage of wheels with wooden naves made in Bengal, when sent to Futteghur was as follows, the naves were reduced in diameter ½ an inch, the felloes ⅛th in depth, and ⅙th in breadth, and that the spokes shrank both in breadth and thickness, but the extent is not mentioned, neither is their shrinkage in length noticed; from which we may infer, that if there was any it was to a very inconsiderable extent, an inference which accords with practical results; as woods chiefly shrink but very little in their length in comparison with what they do in their breadths and thicknesses. These observations are given in support of our argument, that wheels with wooden naves however well put together when newly made, become disorganized in the first instance by the separation of the spokes and naves, arising from the shrinking of the latter from the former; and as the figure of the spoke tenon affords no other means of bringing these parts together, than that of re-tiring the wheel, we consider this operation is more likely to be required, and more frequently to be executed, than would ever be demanded or found necessary with metal nave wheels.

We will now see in what manner the operation of re-tiring wheels affects their original form and strength.

We have observed in wheels with wooden naves, that have undergone the operation of re-tiring, or of having their tire rings reduced for the purpose of forcing the spokes into the nave up to their shoulder, that the dish or angle of introduction of the spokes becomes greater and greater every time the separation is repeated, as the mortices and tenons of the spokes are accurately fitted to each other to form the original dish, the increased angle of inclination can only arise from the wearing away of these parts, hence the spokes and naves can have no firm hold of each other, and the wheel from want of cohesion in its parts must soon become unserviceable.

As the proportionate shrinkage of the same woods of different dimensions, is in increased ratio to their dimensions, as their increase, and as the spokes are of greater breadth and thickness at the nave end in metal naves, this part of the wheel must consequently be less liable to derangement than when wooden naves are used; but even allowing for the sake of argument, that the shrinking in breadth and thickness in metal naves to be double or more than in wood, there will still be these advantages in the former over the latter: a constant and firm union of the parts from the mode of construction; and by the modes of effecting this, noticed in a former paragraph, means are afforded of retaining the dish or inclination of the spokes at the same angle, as fixed when first made, and thus the proper bearings and supports of the different parts in their true positions, will ensure the unity and consequent durability of the whole wheel.

Although wooden naves may be very durable, and from being barrel shaped, considered as strong, when composed of two or more pieces, as when cut out of a solid, yet, for the reason assigned, we must differ in opinion from our Bengal colleagues as to their efficiency in comparison with metal nave wheels, and because that we believe from the want of proper cohesion of parts in the former, there is in them a far greater expenditure of spokes and felloes than in the latter. There is probably at present a great expenditure of these materials at Madras and Bombay, but this may easily be accounted for, Teak wood has of late been used in wheels, as in other parts of the carriage. The Board having pronounced in the strongest terms, their opinion of unfitness of Teak for the purpose, and as an amendment to the suggestion offered by our Bengal colleagues, that Madras and Bombay wheels, should be sent to the upper provinces in order to ascertain the effects of climate on metal nave wheels, we would beg to propose, that brass naves should be sent to Futteghur, with instructions to the Carriage agent, to make up a number of wheels of the prescribed woods equally seasoned, half of the number being with brass naves, and the other with wooden naves, and that these wheels be exposed at the same periods, and under similar circumstances. We propose this, because the Teak wheels sent with the experimental carriages from Madras and Bombay, have already cracked and split from change of climate and exposure in Bengal; but as we have said before, these injuries to the wheels have arisen from the use of Teak in their construction, and it is relevant to add, that wheels made in Bengal even with the best materials are found to be so much acted upon during the transmission to the upper provinces, as to require a thorough repair and setting up on their arrival there.

Our Bengal colleagues have adverted to the facility of changing the axle boxes in wooden naves, under an impression that when the interior of the metal naves becomes worn, the whole must be recast. This however will not be necessary, as there are various ways of meeting the objection; firstly, by casting the box separate from the nave plates; secondly, by introducing brass boxes, corresponding with the bearing surfaces, on the axle arm, and securing them by screws to the nave plates. In any case new boxes may be tightly fixed and secured, by any of the simple methods in common use with every description of machinery. We are of opinion, however, that constructed as the metal nave wheels are, there is neither that play, nor uneven severe friction, between the axle and box, as there is in wooden nave wheels, in which the boxes are constantly separating from the wood, and that the former would last, without perceptible alteration (being of gun metal) for a much longer period than the latter would cast of brass. We believe that the durability of a brass nave box in Bengal, may be taken at 10 or 15 years, and that of the gun metal nave boxes, attached to the metal naves, might safely be taken at 20 years under similar circumstances, so that the facility of repairs in either is not an object of such importance, as to demand any particular attention.

We may here remark as relevant to the subject, that the opinion formerly entertained of the advantages arising from the use of brass boxes, with iron axles as causing the least friction, has from more recent experiments in England been proved erroneous. It appears from the experiments, many hundred in number, conducted with the greatest care, and repeated several times to obtain correct results, that bearings of brass and cast iron were both used, and that the latter evinced in every experiment, less friction than the former, to the amount of $\frac{1}{13}$th part.

Wrought iron axle cases, hardened, were used with the cast iron bearings, under these results it would appear desirable that axle arms case hardened, and cast iron boxes should be used in Ordnance carriages, as is the case in all public conveyances and domestic carriages in England, and in this country; the cast iron boxes would certainly last longer, than those of brass or gun metal, the draft would be easier, and if the Government decided on the alteration, there would be no difficulty in attaching them to the nave plates or fitting them to the axle arm.

With reference to the comparative cost of wood, and brass naves, we have to remark, that when the subject of wheels was discussed, with a view to economy, that as cast iron naves cast in the Bombay gun carriage agency, had been many years substituted for brass naves for Ordnance Carriages under that presidency, that the term "metal nave" should be used in our record instead of "brass nave." This was agreed to by the Board, but the Supreme Government were pleased to determine in favor of brass naves for general adoption, from which we are led to conclude, that the original cost of the relative materials, whether of wood, or cast iron, or brass, has been taken in consideration, as also the ultimate value of the latter when worn out, a contingency judging from past experiences, which must be fixed at some very remote period.

The durability of brass and iron naves may probably be taken as equal, while the original cost of the first is greater than the second, as is also its ultimate value, as old brass when worn out. We consider these metals to be equally well adapted for nave plates, and if the question is to be determined by expence, we would rather give the preference to cast iron, and for these reasons, because its original cost would be less, and next, because it can be more easily made in a gun carriage agency, which has or ought to have, the means of casting moderate sized work in iron. The figure and dimensions being precisely the same in both instances, there is this difference in constructing them, brass nave plates are cast in the solid, and the laborious and protracted operation of turning them down to their exact dimensions, must be first gone through, after which the circular and triangular bolt holes must be made by filing, but in the making of cast iron nave plates, these operations are not necessary, as the plates are received from the mould of their proper figures and dimensions, with all their perforations ready and requiring only to be cleaned a little with a file.

It is true that native establishments attached to batteries, cannot be looked to for the supply of cast iron nave plates and boxes, but as it is known that they can cast in brass, no difficulty need be apprehended on this score; if accidents should occur on service, requiring nave plates to be replaced, which from past experience, may be considered not likely to be of common occurrence, brass ones might be easily made by them, and substituted for the occasion; but we may add, that spare nave plates and boxes, whether of gun metal or cast iron, might easily be provided in addition to the spare wheels if deemed necessary, and that these spare plates would not occupy the space, nor be of the weight of the quantity of metal required, to cast these articles in brass, while the spare nave plates and boxes whether of iron or gun metal, would at once be ready for immediate use.

These remarks on the construction of wheels, naturally lead us to the consideration of the mode in which the felloes of wheels are cut out of the timber, and formed into the curved shape required in the gun carriage agencies throughout India; and as we felt that this portion of the construction is very faulty and capable of remedy, we have most earnestly to solicit the attention of Government to the following observations.

As the strength of wheels depends upon the accurate fitting of their component parts, and the mode of arranging them with reference to the direction of their fibres, that one support may be given to resist severe strains and shocks to which wheels are subjected in travelling and in firing; it will be observed that in their construction attention is required in the points noticed, and that the placing and union of the different parts, so that the strain may act upon the fibres of the wood in the most advantageous direction is of importance, and should be attended to.

The felloes being axis of the circle forming the wheel, it is requisite that the fibres should run as continuous as possible, in the direction of their curves; but as timber cannot be procured, with the degree of bend adapted to these curves, the felloes are now cut out of blocks of the form required, without reference to the direction of the fibres; and hence we find, that the felloes are constantly splitting, occasioning great inconvenience on service, and a vast expence to the state for repairs. Teak is already stated as in use under the Madras and Bombay presidencies for felloes, but experience has proved its unfitness for this, as well as of other parts of Ordnance Carriages, noticed in our proceedings, and although Sissoo is much prized in Bengal, yet from its being more or less straight grained, is proved liable also to the evil we have mentioned.

From past observations, and from a minute examination recently, of a great variety of wheels, we are satisfied that the splitting of the felloes, which almost invariably commences at the point of junction with each other, arises from a want of continuity in the running of the fibres, in the direction required by the circular form of the wheel.

To obviate this inconvenience in England, the felloes instead of being cut out of the block into the required shape as in India, are made from Ash and bent into the required shape by means of Steam, and by this mode of forming them, the continuity of the fibres in the curved figure of the felloes is insured.

This mode of constructing wheels has long been practised in England, and we feel convinced that both efficiency and economy in reducing the amount of repairs, would arise by its adoption in this country.

(Signed) J. Stevenson, *Lt. Col. Horse Arty.*
W. Whitlie, *Bt. Capt. Horse Arty.*

FORT WILLIAM, 19th March, 1838.

Proceedings of the Special Board of Artillery Officers.

The Board having contrasted the violent action and jumping of the trail, and consequent distress to the carriage, with the elevating screw attached to the cascable of the gun, with the more easy and gliding recoil with a flat headed screw under the base ring, have after mature deliberation and trial of the two modes, resolved to have the screw unattached to the breech as in the howitzers. They deem it right to record, that their colleague Lieut. Col. Tennant has expressed himself as fully concurring in this determination, and accordingly the position of the transom has been altered.

The construction of the 9 pounder carriage having been completed, according to the plan detailed in these proceedings, it was put to the same description of trial as the other light field carriages, together with a Bengal 9 pounder of 8 cwt. 3 qrs. and an English 9 pounder of 13½ cwt. and the superiority in steadiness and regularity of recoil of the Board's carriage with the 10 cwt. gun, over the other two which had the elevating screws attached to the cascable was confirmed.

Reports of these trials, as also one with the 10 cwt. 9 pounder, on the Board's carriage, in which the same service charge 3 lbs. as in the English 13 cwt. 9 pounder, were used under similar circumstances are annexed* and it is worthy of remark, that in this last trial the action of the 10 cwt. gun carriage, was perfectly steady, while that of the 13 cwt. gun carriage was attended as before, with severe shocks from the jumping of the trail.

* Reports not given.

The Board have in reference to their former observations on the subject of these trials, submitted this carriage to this severe proof, with the object of placing its strength and fitness, under every circumstance, as far as possible beyond doubt equally with others; and they feel every confidence after the result obtained, in recommending its general adoption for the service; while they observe that none of the carriages at any of the presidencies can be considered as affording any such security.

They beg therefore to re-urge the necessity of using the same description of wood, or others having similar qualities and equal strength, as has been adopted in the proof carriage in its component parts, and the only means of preserving the same dimensions in the same thing, and that uniformity which is so desirable in all Artillery equipments.

We have already recorded in our proceedings, our opinion of the unfitness of Teak, in general use under the Madras and Bombay presidencies, for Light Field Artillery Carriages.

The proceedings of this Board, and others that have been laid before them, it is conceived bear ample testimony of the inefficiency of the present carriages for service at all the presidencies, and it has come to their knowledge,that within a very recent period, three Light Field Artillery Carriages broke down in one morning at Dum Dum, when firing the ordinary service charges.

In consequence of the alteration determind on, regarding the elevating screws to guns, which it is now agreed, shall no longer be attached to the cascable, a practice with all but 6 pdrs. we believe to be followed in the Royal Artillery also. The following are requisite which are therefore exhibited in the plans.

In order to use the capstan headed screw, the Board advance the line *w. q.** 3½ inches. The transom should no longer be extended down to the lower surface of the cheek, but be exactly the same as the howitzer transom, and the cheek cut off above in the same way, excepting that the slope of the reinforce, should terminate in the angle of the bend of the cheek, instead of in the shoulders of trunnion holes. The transom bolt for *gun carriages* to be fixed along the *lower rear corner* of the transom, and *in the upper*

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* Plate 1. Fig. 1.

rear corner for *howitzers.* Thus in addition to wheels, axletrees, trailplates, trail handspikes, limber boxes, being alike for all Light Field Artillery Carriages, the transoms will also be similar, and one elevating screw of 16 inches long will answer for all light field guns and howitzers.

Should the Supreme Government be pleased to confirm the recommendation of the Board, for the adoption of the flat headed elevating screws, it may be deemed advisable, that the superintendent of the Foundry should be instructed to cast all brass ordnance of these calibres without loops, as they entail considerable labour in forming and finishing.

The difference in weight of the proposed carriages, and those in use at the several presidencies is very trifling, as will be seen in the following comparison, and it is alluded to, to remove any apprehension that may arise on this score.

Weight to raise the Trail of

	12 Pdr.	6 Pdr.	24 Pdr.	9 Pdr.
Board's Carriage	186 lbs.	187 lbs.	265 lbs.	258 lbs.
Bombay do.	147 „	174 „	174 „	258 „
Madras do.	187 „	184 „	252 „	210 „
Bengal do.	266 „	224 „	243 „	270 „
Woolwich do.	....	....	250 „	243 „
Major Timbrell's do.	....	....	258 „	259 „

The Board's 6 pdr. requires 37 lbs. and 12 pdr. howitzer, 80 lbs. less to raise the trail from the ground, than the Bengal Carriage, and the 9 pdr. carriage 12 lbs. less than the corresponding carriage in Bengal.

The Board's wheel with the brass nave, weighs about 44 lbs. more than the Bengal wheel, 2. cwt. 2. qrs. 10lb. being taken as the average weight of the former and 2.cwt. 0.qrs. 22 lbs. of the latter, but they do not consider the difference in the weight of wheels as at all material.

Weight of Carriages without Wheels.

	12 Pdr.			6 Pdr.			24 Pdr.			9 Pdr.		
	Cwt.	qrs.	lbs.	Cwt.	qrs.	lbs.	Cwt.	qrs.	lbs.	Cwt.	qrs.	lbs.
Board's Carriage......	7	0	5	6	0	25	8	2	15	7	1	25
Bombay do.	5	2	10	4	3	27	6	1	2	0	0	0
Madras do.	6	1	20	6	0	16	7	3	10	7	1	5
Bengal do. ...	6	3	22	6	1	8	7	3	10	7	1	5
Major Timbrell's do.	0	0	0	0	0	0	7	1	5	6	3	14
Woolwich do.	0	0	0	0	0	0	9	0	0	7	0	18

The Board's 12 pdr. howitzer is eleven pounds heavier than the Bengal howitzer, the 6 pdr. is eleven pounds lighter, the 24 pdr. howitzer 61 lbs. and 9 pdr. 20 lbs. heavier.

With reference to these remarks on the several weights of carriages, it should be borne in mind, that many of the lighter carriages which have been tried, failed in the course of our experiments.

It is deemed proper to notice what has been stated to the Board, that the wood used in the construction of the carriages made under their superintendence, was not seasoned timber, none having been procurable of a proper description, which though not of any importance as affecting at the present date, the efficiency of the carriage, would lead to misconception from its shrinking in subsequent exposure, or when removed to a different climate.

The Board have determined, that the inner handles of all ammunition boxes, both of limber and waggon shall consist of a ring and made to turn on a pivot fixed on the boxes.*

In concluding their report, the Board consider it due to themselves to record, that, entrusted as they have been with the important duty of proposing for general adoption in India, a pattern carriage for each description of Field Ordnance, it would have been a dereliction of the duty they owe to Government, had they submitted any plan not supported by proper trial, which might have involved the State in heavy expense by their adoption, and possibly leave the question as unsettled and as doubtful as before.

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* Plate 15.

It is indisputable, that many of the patterns at present in use at the three presidencies, are unfit for service, but the Board entertain with confidence, the hope, that those they have recommended will, after the severe trials they have undergone, be found efficient, durable, and in every respect acceptable to the Indian Artillery.

The Board have to add, that as the 9 pdr. carriage was only completed on the 10th ultimo, the necessary experiments with it, could not be commenced at an earlier period.

SUPPLEMENTARY REPORT OF THE PROCEEDINGS OF THE SPECIAL BOARD OF ARTILLERY OFFICERS.

With a view of determining the most eligible position for the axletree of the waggon, the Board have instituted a series of experiments, of which a statement is annexed, and after a careful consideration of the result generally, have decided that it shall be placed so that the distance from the centre of the hind axle, shall be 8 feet 5 inches; and that the position of the boxes of the waggon body, with reference to the centre of hind axletree, shall be 8 inches from centre of the hind axletree to front of the hind boxes; 12½ inches from centre of the hind axletree to rear of the front boxes.

Whilst making these experiments, the Board took this opportunity of ascertaining the relative draft of Ordnance Carriages, and it is matter of gratification to them to find, that with an equal proportion of ammunition, heavier metal, and a more substantial carriage, the draft of their equipments is less than that now in use in Bengal.

(Signed) J. Stevenson, Lt.-Col., H. A.
President, Board Art. Officers.
„ C. Graham, Lieut.-Colonel,
Bengal Horse Arty.
„ R. Seton, Captain,
Madras Horse Artillery.
„ W. Whitlie, Bt.-Captain,
Bombay Horse Artillery.

EXPERIMENTS IN DRAUGHT, BY THE SPECIAL BOARD OF ARTILLERY OFFICERS.

Date.	Experiment.	DESCRIPTION OF THE CARRIAGES EMPLOYED.	Weight of Waggons and Gun Carriages with Limbers, loaded with Ammunition.			From centre of the front axle to the centre of hind axle.		Position of the boxes on the body with reference to the centre of the axletree.				Weight required to remove the several Carriages.		
								Front of the Hind Box.		Rear of the Fore Box.				
								Behind	Before	Before	Before			
			cwt.	qrs.	lbs.	Ft.	In.	Ins.	Ins.	Ins.	Ins.	Cwt	qrs.	lbs.
1838 March 2d		*On a horizontal plane distance from splinter bar to pulley 50 feet.*												
	I	R. P. Bengal ammunition waggon limbered up carriage No. 1	21	2	7	7	8	0	upon	0	3·5	1	3	19
	II	Do. do. do. do. No. 2	21	2	7	8	5½	0	0	9·5	12·5	1	0	16
	III	Do. do. do. do. No. 3	21	2	7	8	¾	0	0	4·75	7·75	1	1	20
	IV	Board of Artillery Officer's Waggon............ do. No. 4	21	2	7	8	1	1·375	0	0	4·5	1	0	20
	V	Do. do. do. 24 Pdr. with piece of cwt. 9. 3. 9 ... . No. 5	26	1	21	9	8¾	0	0	0	0	2	0	2
	VI	Do. do. with piece of cwt. 10. 0. 5 No. 6	26	1	24	9	8¾	0	0	0	0	2	0	0
	VII	do. do. 9 Pdr., with wheels touching a 2½ inch square bar of iron, placed as an obstacle. No. 6	0	0	0	0	0	0	0	0	0	0	0	0
		Required to clear the limber over it: the gun being limbered up in both cases......................................	0	0	0	0	0	0	0	0	0	6	0	9
	VIII	Required to pass the Gun wheels at same distance the carriage being in a state of rest..................................	0	0	0	0	0	0	0	0	0	8	2	9

On an inclined plane 15°, distance from splinter bar to pulley 64 feet.

March 3d	IX.	R. P. Bengal Waggon, precisely as on the 2d inst. carriage No. 1	21	2	7	7	8	0	upon	0	3·5	13	0	8
	X.	Do. do. do. do. No. 2	21	2	7	8	5½	0	0	9·5	12·5	10	2	5
	XI.	Do. do. do. do. No. 3	21	2	7	8	¾	0	0	4·75	7·75	12	3	14
	XII.	Board of Artillery Officer's Waggon, do. do. No. 4	21	2	7	8	1	1·375	0	0	4·5	10	3	5
	XIII.	Do. do. 24 Pdr. Howitzer Carriage No. 5	26	1	21	9	8¾	0	0	0	0	14	0	2
	XIV.	Do. do. 9 Pdr. Gun do. No. 6	26	1	24	9	8¾	0	0	0	0	13	2	5
10th	XV.	Do. do. Limber loaded, without car. attached	7	3	18	0	0	0	0	0	0	4	1	5
	XVI.	Do. do. 24 Pdr. Howitzer, unlimbered muzzle in front, and force applied to axletree with trail resting on ground	18	2	3	0	0	0	0	0	0	8	0	12
	XVII.	Do. do. with trail raised clear of the ground on a horizontal plane with 50 feet rope as on the 2d.	0	0	0	0	0	0	0	0	0	0	0	0
	XVIII	Experiments of the 2d Instant with carriage No. 1, repeated	21	2	7	7	8	0	upon	0	3·0	1	3	12
	XIX.	With the Axletree altered of carriage No. 2 of experiment II. of 2d Instant	21	2	7	7	8	0	upon	0	3·0	1	2	6
	XX.	Do. do. do. 4 do. IV. 2d do.	21	2	7	8	9	0	0	6·625	12·115	1	0	20
	XXI.	Board's 24 Pdr. Howitzer Car., precisely as on the 2d do.	26	1	24	9	8½	0	0	0	0	1	2	29
	XXII	R. P. Bengal beam trail 24 Pdr. Howitzer Carriage, with limber loaded as above with piece of cwt. 8 2 12	24	2	0	9	¾	0	0	0	0	1	3	5
	XXIII	Board's 24 Pdr. Howitzer Gun precisely as on the 2d	26	1	24	9	8¾	0	0	0	0	1	2	20
	XXIV	R. P. Bengal beam trail 9 Pdr. Gun 24 Pdr. Carriage with limber loaded as above with piece of cwt. 8 3 9	24	2	9	9	3½	0	0	0	0	1	3	5
	XXV.	With the Carriage of No. IV. with hind boxes, altered, and with the perch shortened 4 inches	21	2	7	8	5	0	0	80	0	0	3	20
	XXVI.	With the carriage on inclined plane of 15° as above	21	2	7	8	5	0	0	80	12·5	10	2	26
	XXVII	Do. do. do. do.	21	2	7	7	9	0	upon	0	4·5	12	2	10
	XXVIII.	Do. do. do. on the level	21	2	7	7	9	0	upon	0	4·5	0	3	0

N. B.—Weight of wheels not included in weight of carriage. The limbers and bodies of the waggons, loaded with the compliment of ammunition assigned by the Board for the 6 Pdr. Equipment.

(Signed) J. STEVENSON, Lieut.-Colonel, H. Artillery,—*President, Special Board of Artillery Officers.*
„ C. GRAHAM, Lieut.-Colonel, H. Artillery.
„ R. S. SETON, Captain, Madras H. Artillery.
„ W. J. WHITHE, Brevet Captain, Bombay H. Artillery.

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BENGAL SIEGE TRAIN TABLES.

The following Tables are intended to exhibit the number, and nature of Ordnance composing three classes of Siege Trains, as laid down by the Military Board, also the dimensions, of different parts of Ordnance Carriages, the dimensions and weight of the various implements and stores, and the quantity and weight of ammunition allowed to each train when equipped for service.

The Tables are divided in four parts.

1st. The Ordnance and Carriages, also carriages for transporting mortars and stores, with spare carriages and half wrought materials &c.

2d. Implements.

3d. Ammunition and Laboratory Stores.

4th. General Stores.

These Tables shew the quantity of each article allowed for each train.

List of Ordnance and Carriages; also Carriages for transporting

		Train No. 1.						
		Guns.		Howitzer.		Mortars.		
		24 Pounedr.	18 Pounedr.	10 Inch.	8 Inch.	10 Inch.	8 Inch.	5½ Inch.
Ordnance...	Brass....................	0	0	0	0	0	0	10
	Iron........................	12	12	4	6	4	10	0
Carriages ..	Complete Travelling with Limber, elevating screws, handspikes &c...	12	12	4	6	0	0	0
Beds..... ..	Iron with 2 coins each.	0	0	0	0	4	10	0
Mortar......	Wooden ,, 1 ,, ,,	0	0	0	0	0	0	10

Carriages and Carts for transporting Mortars, Stores, and Artificer's tools, also spare Gun Carriages and Platform Carts; spare Wheels &c. and half wrought Materials.	Number.	Weight lbs.
Carriages, Cart Artificers...... ...	6	0
Carriages, Cart Platform, with Platform Limber.....	23	0
Carriages, Cart, Store or Artificers with Limber...	24	0
Carriages, Cart, Transport Medium.	3	0
Carriages Waggon Ammunition.......	—	—
Spare.		
Beds, Mortar Wooden ....5½ inch.	2	0
Carriages, Cart Platform, with Limber	4	0
Carriages with Limber...... ..24 Pdr.	2	0
....,,........,,... ..... 18 ..,, ...	2	0
.. ...,,........,,...10 inch Howitzer.	1	0
...,,.........,, .. 8 . .. ...,,......	1	0
Poles, Cart......	8	0
.....,,......Siege Gun Carriage....	6	0

Mortars and Stores; with spare Carriages and half wrought Materials

Train No. 2.							Train No. 3.							REMARKS.
Guns.		Howitzer.		Mortars			Guns		Howitzer.		Mortars			
24 Pounder.	18 Pounder.	10 Inch.	8 Inch.	10 Inch.	8 Inch.	5½ Inch	24 Pounder.	18 Pounder.	10 Inch	8 Inch.	10 Inch.	8 Inch.	5½ Inch.	
0	0	0	0	0	0	6	0	0	0	0	0	0	4	
6	6	2	4	2	6	0	4	4	1	2	1	4	0	
6	6	2	4	0	0	0	4	4	1	2	0	0	0	
0	0	0	0	2	6	0	0	0	0	0	1	4	0	
0	0	0	0	0	0	6	0	0	0	0	0	0	4	

Number.	Weight lbs.	Number.	Weight lbs.	REMARKS.
4	0	2	0	For tools.
13	0	8	0	For Mortars and Beds.
12	0	6	0	For Stores.
2	0	1	0	As many as the Magazine can furnish to the extent required, according to the number of waggons taken, the fewer hackeries will be required, but the number of *Ordnance* Bullocks as laid down in Table No. 6 must be increased. Many Stores are less liable to damage when carried in this way, than when packed on hackeries, but Magazines cannot always furnish any considerable number.
1	0	1	0	
2	0	1	0	
1	0	0	0	
1	0	0	0	
0	0	0	0	
1	0	0	0	
4	0	2	0	
4	0	2	0	

	Train No. 1.	
	Number.	Weight lbs.
Wheels, Cart	16	0
„ Siege Gun Carriage	6	0
„ „ Limber	6	0
HALF WROUGHT MATERIALS.		
Axle tree Bed Cart and Limber	8	754
„ „ Siege Gun Carriage	6	756
Beam Howitzer 10 inch	1	275
„ „ 8 „	1	195
Cheeks Siege Gun Carriage 24 Pdr.	2	1204
„ „ „ „ 18 „	2	1204
„ „ Howitzer 10 inch	1	819
„ „ „ 8 „	1	603
Felloes, Cart	96	1344
„ Siege Gun Carriage	36	1343
„ „ „ Limber	36	1110
Helves for Axes, Mamooties &c	0	0
Naves, Cart	16	744
„ Siege Carriage	12	872
Poles, Siege Gun Carriage	6	483
„ Cart	8	1460
Spokes, Cart	192	1144
„ Siege Gun Carriage	72	819
„ „ Limber	72	762
TRANSOMS, VIZ.		
24 Pounder — Breast	4	164
24 Pounder — Centre	4	284
24 Pounder — Trail	4	284
18 Pounder — Breast	4	164
18 Pounder — Centre	4	284
18 Pounder — Trail	4	284
10 Inch Howitzer — Breast	2	154
10 Inch Howitzer — Centre	2	164
10 Inch Howitzer — Trail	2	172
10 Inch Howitzer — Sliding	2	172
8 Inch Howitzer — Breast	2	92
8 Inch Howitzer — Centre	2	98
8 Inch Howitzer — Trail	2	106
8 Inch Howitzer — Sliding	2	106
For the Equipment of the above Mortar and other Carts and spare Carriages.		
Chains, Draft Leading for Carts	129	0

Train No. 2.		Train No. 3.		Remarks.
Number.	Weight lbs.	Number.	Weight lbs.	
8	0	4	0	
4	0	2	0	
4	0	2	0	
4	376	2	188	
4	504	2	252	
1	275	1	275	
0	0	0	0	
1	602	1	602	
1	602	1	602	
1	819	1	819	
1	603	1	603	
48	672	24	336	
24	882	12	441	
24	740	12	370	
0	0	0	0	⅓ Spare
8	372	4	186	When turned down: when quite in the rough they are more than double this weight.
6	436	6	436	
4	322	2	161	
4	320	2	115	
96	572	48	286	
48	546	24	273	
48	508	24	254	
2	82	1	41	
2	142	1	71	
2	142	1	71	
2	82	1	41	
2	142	1	71	
2	142	1	71	
1	77	1	77	
1	82	1	82	
1	86	1	86	
1	86	1	86	
1	46	1	46	
1	49	1	49	
1	53	1	53	
1	53	1	53	
72	0	39	0	

	Train No 1.	
	Number.	Weight lbs.
Chains, draft leading Siege Carriages spare....	54	0
...,, ..,,...,, ..for spare Bullocks...............	109	0
...,,...,,........Pole Yokes for Artificer's Cart......	6	0
..,,...,,........Pole Yoke for Platform and Store Carts.	51	0
..,,...,,......Pole Yoke for Medium Transport Carriage-..	3	0
...,,...,,.....Pole Yoke for Siege Carriages Spare 24 Pdr.....	2	0
... ..,,.. .,,... ..,, ...,,.........,,....18. .. ..,, ...	2	0
....,,....,, ..,, . ..,,.....,, 10 inch Howitzer.	1	0
... . ,, ... ,,.......,,.....,, . .,, ..8 .. ..,,..,,.....	1	0
Chains, Locking............................ 24 Pdr.	2	0
... ,, ... ,, ... 18 ,,	2	0
... ,, ... ,, ... 10 inch Howitzer ...	1	0
... ,, ... ,, ... 8 ,, ,, ...	1	0
... ,, ... ,, ... Siege Train Carts...	51	0
Clip Band, Pole Yoke..................	132	0
Drag-ropes, Common...................... Sets ...	53	0
Esses iron......	156	0
Handspikes, common...............	24	0
.... ,, ... Traversing..........	16	0
Kegs, Grease........	66	0
Keys, for Cap-squares................................	12	0
Linchpins..	369	0
Screws Elevating.......................... 24 Pdr.	2	0
...... ,, ,, ... 18 ,,	2	0
...... ,, ,, ... Howitzer 10 inch.	1	0
...... ,, ,, ... 8 ,,	1	0
Washers, drag.........	312	0
Yokes......	249	0
,, for spare Bullocks..........................	109	0

TRAIN No. 2.		TRAIN No. 3.		REMARKS.
Number.	Weight lbs.	Number.	Weight lbs.	
26	0	0	0	
58	0	31	0	
4	0	2	0	
25	0	15	0	
2	0	1	0	
1	0	0	0	
1	0	0	0	
0	0	0	0	
1	0	0	0	
1	0	0	0	
1	0	0	0	
0	0	0	0	
1	0	0	0	
25	0	14	0	
68	0	36	0	
28	0	14	0	
80	0	36	0	
12	0	0	0	
8	0	0	0	
31	0	17	0	
6	0	0	0	
174	0	99	0	
1	0	0	0	
1	0	0	0	
0	0	0	0	
1	0	0	0	
158	0	69	0	Including those on Carriages.
132	0	57	0	
58	0	31	0	

EXPLANATORY TABLES.

ORDNANCE.

The long 24 pounder gun of 9 feet, 6 inches—and 18 pdr. of 9 feet, are to be used in all battering trains.

In preparing for a march it is advisable in order to diminish the weight of draft, to run the guns back into the travelling trunnion holes.

This operation, as well as that of returning the guns to the service trunnion holes is performed (the gun being limbered up) by applying the hand jack as directed under that head.—In the former instance, the pole of the limber is thrown up, in the latter down towards the ground.

CARRIAGES GUN AND HOWITZER.

Are made up at the gun Carriage Agencies, and materials for their repairs are supplied from thence to magazines on indents passed by the Military Board.

All carriages for battering as well as for Garrison guns, have their cheeks made parallel to each other, and are joined together by transoms; carriages of this description often have their cheeks made in 2 pieces.

In the iron howitzer carriages, which have a beam as well as cheeks, there is a sliding transom that works in a grove made on the inner side of the cheeks, and by slipping which back, the howitzer may be elevated to nearly 45 degrees.—The elevating screw bed is fixed to the sliding transom, and to allow the screw to work freely, a groove is cut lengthways in the beam as far towards the trail as it is necessary, to slide the transom back to give the highest elevation to the piece.

No handspikes are fixed to the trail of howitzer carriages when in battery, but the piece is traversed by applying the common handspike to that part of the beam that projects beyond the body of the carriage.

Trucks are used at the trail of howitzer carriages, and between these and the trail transom, coins or wedges are placed that may at pleasure be pushed home to prevent the trucks revolving, which in some degree, reduces the recoil; but in battery when heavy charges are used, fascines or blocks of wood should be placed in rear of the wheels.

All gun and howitzer carriage wheels are 5 feet in diameter, and the limber wheels 6 inches less.

To give less shock to the gun carriages, and to have them under better cover in the battery, the limber wheels should always be substituted for those of the gun carriage which will lower the carriage three inches, but it is in general preferable to fire the howitzers with the high wheels.

A store box to contain the various petty stores, or instead of these a round or two of ammunition when requisite, is carried between the cheeks of all siege gun and howitzer carriages.

The following half wrought materials are required for Ordnance Carriages.

24 *or* 18 *Pounder.*

1 Axletree Bed.
1 Board Elevating.
2 Cheeks.
1 Rest Elevating board.
1 Roller stop block upper
1 ....do....do....under
1 Transom breast.
1 ......do.....centre
1 .....do......trail
1 Coin.
2 Handspikes.
1 Roller.
12 Felloes.
2 Naves, for two wheels.
24 Spokes.

Limber.

1 Axletree bed or Bolster.

10 *or* 8 *inch Howitzer.*

1 Axletree Bed.
1 ....do....for trucks
1 Beam.
2 Cheeks.
2 Coins recoiling.
1 Transom breast.
1 ....do....centre
1 ....do....trail
1 ....do....sliding
2 Sliding bottoms upper.
12 Felloes.
2 Naves for 2 wheels.
24 Spokes.

Limber.

1 Axletree bed.
1 ....do....traversing.
1 Bolster or splinter Bar.

1 Bar splinter.
1 .... do....framing 1st. size
1 ....do......do....2d....
1 Pole.
1 Pole prop.
12 Felloes.
2 Naves for 2 wheels.
24 Spokes.

1 ....do....framing 1st size
1 ....do....do....2d.
1 ....do....Cross.
1 Guider.
1 Pole.
1 Pole prop.
12 Felloes.
2 Naves.
24 Spokes.

BEDS MORTAR.

For cast iron mortars, the beds are also of cast iron, and are sent with the mortars from England, but for brass mortars the beds are made of wood, having their cheeks and transoms parallel. Saul or Sissoo is used indiscriminately for all the wood work.

The wooden beds are made at the Gun Carriage Agencies, and beds as well as half wroughts are from thence supplied to magazines on indents.

In wooden beds the breast transom is placed with reference to the cheeks at an elevation of about 130 degrees, and the centre transom at 45 degrees, while the rear transom is placed perpendicularly; mortars with these beds can be elevated to 90 degrees, and depressed from that by taking out the elevating screw and board, to point blank; the elevating screw has a capstan head with four handles, and is fixed in the centre of the breast transom.

The cheeks and transoms when not procurable large enough in one piece, are joined by a longitudinal dove-tailed groove, smaller towards the rear than the front;-in separating the two cheek pieces when joined, take out the bolts, rivets, and garnish plate nails, and then strike on the rear end of the cheeks;—each bed has two truck wheels attached, which fit on the small axles fixed in the cheeks immediately in the rear of the front transom; these wheels are only used when the bed is required to be moved from place to place in magazines, or to run the bed in or out of the battery &c. but when in battery these wheels are taken off.

The two axles when the wheels are off, answer for traversing bolts to traverse the bed, and the rear transom is placed high enough on the cheeks to admit of the point of a handspike going under to assist in moving the bed forward after each firing, the bolt fixed in the centre of the rear transom is also useful to traverse the bed to the right or left as occasion requires, and pieces are cut out of the forepart under the checks for the same purpose.

Each bed has two rings fixed to the side and projecting in front of each cheek to which a drag-rope can be applied to assist in dragging it in, and out of battery;—they are also useful to lash the bed to its cart or carriage.

One bed is allowed for every mortar equipped for service, also one spare for every four wooden beds.

Each bed requires the following,

Half Wrought Materials, Vizt.

2 Cheeks or 4 cheek pieces.
1 Breast transom or two transom pieces.
1 Centre..... ,, ... ,, ... ,, ... ,, ...
1 Rear....... ,, ... ,, ...,, ... ,, ...
1 Elevating board.
1 Coin
1 Coin stop block.
2 Truck wheels.

Cast iron beds have no elevating screws, but each bed is supplied with two wooden coins, one giving an elevation of 45 degress, the othes 30 degress, and if both are used together, give 75 degress see under head "coins for mortars"

Carriages, Carts.

Employed with siege trains are of three kinds as follows, vizt.

1st. *Carriages cart,*—store with platform limber, are used for the conveyance of small stores, and for such as it is requisite to secure against the weather, and that should not be exposed to travel on the common hackeries of the country.

24 are allowed for train No. 1
12 .... ,, .. ,, ... ,, .. No. 2
6 .... ,, .. ,, ... ,, .. No. 3

2d. *Carriages, cart platform with platform limber*, are used for the conveyance of mortars and other beds.

2 are allowed for every 10 inch mortar and bed
1 .... ,, .. ,, ... ,, ... ,, ... 8 ... ,, ...
1 .... ,, .. ,, ... ,, ... two 5½ inch ,, ...
also, 4 are allowed spare for train No. 1
2 ... ,, ... ,, .. ,, .. ,, .. No. 2
1 ... ,, ... ,, .. ,, .. ,, ... No. 3

3d. *Carriages, cart artificers common*, are used for the conveyance of Artificers tools and stores.—No limber is attached to this description of cart.

6 are allowed to train No. 1
4 .. " ...... " .... No. 2
2 .. " ...... " .... No. 3

TABLE No. 1.

	BED MORTAR CHEEK PATTERN.																								
	Cheeks.			Transom breast.			Transom centre.			Transom trail.			Elevating board.			Elevating board stop lock.		Truck wheels.			COIN.				
	Length	Breadth	Thickness	Length	Breadth	Thickness	Length	Breadth	Thickness	Length	Breadth	Thickness	Length	Breadth	Thickness	Length	Square	Diameter	Thickness at Nave box	Thickness at Tire	Length	Breadth at narrow end	Breadth at broad end	Thickness at thick end	Thickness at small end	Weight
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.	ins.	ins.	lbs
5½ inch....	39½	12	4	7⅝	10	3¾	7⅝	9	3¾	7⅝	8	3¾	19½	6	1½	6	2½	15	4	3	16	4¾	5¾	4½	1½	274

TABLE

Dimensions of the finished state of Timber

	Axletree.						Beam.			Board elevating.			Box Handles.		
	Bed.			Rear for Trucks.											
	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	Ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
24 Pdr. Gun Carriage.	46½	9	8	0	0	0	0	0	0	50	9	3⅜	34	2½	2
18 ,, ,, ,,	46½	9	8	0	0	0	0	0	0	46	9	3⅜	34	2½	2
10 inch Gomer Howzr.	46½	9	8	39	9	8	111½	8	6	0	0	0	0	0	0
8 inch ,, ,,	46½	9	8	34	8	8	102	8	6	0	0	0	0	0	0

	Roller.			Roller stop block upper.			Roller stop block under.			Tran					
										Breast.			Centre		
	Total length including the nuts.	Diameter at the end.	Do. at the centre.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
24 Pdr. Gun Carriage.	12½	5	4	9	2½	2	14½	9	1¾	19	10	5	19	16	5
18 ,, ,, ,,	12½	5	4	9	2½	2	14½	9	1¾	18½	9¾	5	18½	16	5
10 inch Gomer Howtzr.	0	0	0	0		0	0	0	0	24½	10⅛	5½	24½	10⅝	5½
8 inch ,, ,,	0	0	0	0		0	0	0	0	20¼	8¾	5	20¼	10⅜	5

No. 2.

Materials for the following Carriages.

Cheek.						Coin.					Coin Recoiling			Handspike.				Rest elevating Bed.		
Length.	Depth at breast.	Do. at Trunnions.	Do. at Elevating screw.	Do. at end of trail band.	Thickness.	Length.	Depth at broad end.	Do. at narrow end.	Thickness at thick end.	Do. at narrow end.	Length.	Breadth.	Thickness.	Diameter at trail front iron.	Diameter at trail rear iron.	Do. at handleend.	Length.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.	ins.
144	14	16	15	10¾	5	20	7½	5¾	6½	2½	0	0	0	3½	2½	1⅞	72½	10½	2	2
144	14	16	15	10¾	5	20	7½	5¾	6½	2½	0	0	0	3½	2½	1⅞	72½	10½	2	2
94	18¾	0	22	13¼	7½	0	0	0	0	0	14	7	4	0	0	0	0	0	0	0
84½	15¼	0	19	16⅜	6¾	0	0	0	0	0	14	5	4	0	0	0	0	0	0	0

soms.									Wheel Materials.												
Sliding.			Sliding bottom upper.			Trail.			Felloe.			Nave.			Spoke.				Tire.		
Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Diameter at middle.	Do. at end.	Length.	Breadth at nave.	Do. at felloe.	Thickness.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.
0	0	0	0	0	0	19	15¾	5	30	4½	6	15	16	14½	30	4½	4⅛	2	183	6	⅝
0	0	0	0	0	0	18½	15¾	5	30	4½	6	15	16	14½	30	4½	4⅛	2	183	6	⅝
22½	14	4½	10½	2	1	24½	15¾	5	30	4½	6	15	16	14½	30	4½	4⅛	2	183	6	⅝
18½	14	4½	12	2	1	20½	15¾	5	30	4½	6	15	16	14½	30	4½	4⅛	2	183	6	⅝

TABLE

Dimensions of the finished state of Timber

	Axletree Bed or Bolster.			Bars.					
				Splinter.			Travers-ing.		
	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
24 Pounder Gun Limber	46½	9	8	33	4	3½	0	0	0
18 „ „ „	46½	9	8	33	4	3½	0	0	0
10 inch Gomer Howitzer Limber	46½	9	8	43½	3¼	3	56¾	3¼	3
8 „ „ „	46½	9	8	43½	3¼	3	56¾	3¼	3

				Wheel.					
	Pole Prop.			Felloe.			Nave.		
	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Diameter at middle.	Do. at end.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
24 Pounder Gun Limber	40	1½	1½	27	4½	6	15	16	14½
18 „ „ „	40	1½	1½	27	4½	6	15	16	14½
10 inch Gomer Howitzer Limber	39½	1½	1½	27	4½	6	15	16	14½
8 „ „ „	39½	1½	1½	27	4½	6	15	16	14½

NO. 2. Continued.

Materials for the following Limbers.

FRAMINGS.									Guider			Pole.							
1st Size.			2d Size.			Cross.													
Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness	Length.	Breadth at front of Splinter bar.	Thickness at front of Splinter bar.	Breadth between Guiders at the end.	Thickness at do. do.	Square at Pole band	Do. at Pole shoe	Diameter at the point.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
26	7	3	36	3½	3	0	0	0	0	0	0	108	0	0	0	0	5½	3½	3⅜
26	7	3	36	3½	3	0	0	0	0	0	0	108	0	0	0	0	5½	3½	3⅜
25	3¼	3	49¼	3¾	3¼	14½	3¼	2½	27	5	3	108	5	5	5	2½	0	0	3⅜
25	3¼	3	49¼	3¾	3¼	14½	3¼	2½	27	5	3	108	5	5	5	2½	0	0	3⅜

MATERIALS.										STORE BOX.					
Spoke.				Tire.			Interior.			Exterior.			Pent lid.		
Length.	Breadth at nave.	Do. at felloe.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Depth.	Length.	Breadth.	Depth.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
27	4½	4⅛	2	165	6	0⅝	20	13¼	11¼	21½	15	12	23	16½	0¾
27	4½	4⅛	2	165	6	0⅝	20	13¼	11¼	21½	15	12	23	16½	0¾
27	4½	4⅛	2	165	6	0⅝	24¾	13	11¼	27	15	13	28	17	1
27	4½	4⅛	2	165	6	0⅝	24¾	13	11¼	27	15	13	28	17	1

TABLE

Dimensions of the finished state of Timber

	Axle-tree Bed.			Fram								
				Long 1st size.			Long 2d size.			Short 1st size.		
	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Car. Cart Store with Gun Limber.	49	7	6	72	4	3½	69½	2¼	2¼	60	4	3¼
,, ,, Platform. ..	48	7	6	72	4	3½	72	2⅜	2⅜	60	4	3½
,, Platform with...,,..,,...	48	7	6	72	4	3½	0	0	0	60	4	3½
,, Artificers common	52	7	6	73	4	3½	79	3¼	3¼	60	4	3½

	Pole Prop.			Post.			Bottom.		
	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Car. Cart Store with Gun Limber..	0	0	0	0	0	0	67½	42	1
,, ,, Platform.....	0	0	0	25	3	2	66	40	1
,, Platform with...,,...,,..	0	0	0	0	0	0	66	40	1
,, Artificers common.....	39	1¾	1¾	24⅛	3	2¼	67½	37	1

NO. 3.

Materials for the following Carriages.

ings.												Guider.			Pole.								
Short 2d Size.			Cross.			Door 1st Size.			Door 2nd Size.						Pole.			Sliding.			Block.		
Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
0	0	0	40	4	2½	60½	5	1½	46½	3	1½	84½	4½	2	120	4	4	0	0	0	17	4	2
0	0	0	55	4	2½	61	5	1½	46	3	1½	84	4½	2	0	0	0	114	4	4	16½	4	2
0	0	0	55	4	2½	0	0	0	0	0	0	84	4½	2	0	0	0	114	4	4	16½	4	2
58	3¼	3	45	5½	2½	0	0	0	0	0	0	0	0	0	165	4⅛	4⅛	0	0	0	0	0	0

Planks.									Wheel Materials.												
Door.			Seat.			Side.			Felloe.			Nave.			Spoke.				Tire.		
Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Diameter at middle.	Do at end.	Length.	Breadth at nave.	Do. at felloe.	Thickness.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
24	24	1	18	14	1	67½	23	1	30	3⅛	3⅜	13	13½	12½	30	3	2½	1½	183	3	0½
24	24	1	0	0	0	70	20	1	30	3⅛	3⅜	13	13½	12½	30	3	2½	1½	183	3	0½
0	0	0	0	0	0	0	0	0	30	3⅛	3⅜	13	13½	12½	30	3	2½	1½	183	3	0½
37	22	1	18	13½	1¼	72	19½	1	30	3⅛	3⅜	13	13½	12½	30	3	2½	1½	183	3	0½

TABLE

Dimensions of the finished state of Timber

	Axle-tree Bed.			Bars.								
				Splinter.			Foot.			Foot small.		
	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Limber for Store Carriages with gun Limber..........................	48	8½	6	68	4	3	63	4½	2½	29	3	1¼
„ „ „ Platform....	48	8½	6	69	4	3⅛	63	1½	2½	0	0	0
„ „ „ „	48	8½	6	69	4	3⅛	63	4½	2	0	0	0

	Pole.				Props.			Planks.			Wheel.		
											Felloe.		
	Length.	Diameter at point.	Square at Pole band.	do. do shoe.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Limber for Store Carriages with gun Limber..................	98	3¼	3⅜	2¼	34	1½	1½	0	0	0	30	3⅛	3¼
„ „ „ Platform...	98	3¼	3⅜	2¼	34	1½	1½	55½	40½	1	30	3⅛	3⅜
„ „ „ „	98	3¼	3¾	2¼	34	1½	1½	55½	40½	1	30	3⅛	3⅜

3 continued.

erials for the following Limbers.

ard oot mber.		Bracket Store box.			Cross pieces.			Bottom Limber cross.			Framing.						Moulding.					
											1st size.			2d size.			Large			Small.		
Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
11	1¼	11	2	1½	19	2	1	0	0	0	34	6¼	2½	48	3½	2½	22½	1½	0½	19½	1½	0½
0	0	0	0	0	0	0	0	40½	2½	2½	34	6¼	2⅝	50	3½	2½	0	0	0	0	0	0
0	0	0	0	0	0	0	0	40½	2½	2½	34	6¼	2⅝	50	3½	2½	0	0	0	0	0	0

Materials.						Ammunition Box.									Store Box.											
Nave.		Spoke.				Interior.			Exterior.			Lid.			Interior.				Exterior.				Lid.			
Diameter at middle.	do. end.	Length.	Breadth at nave.	do. felloe.	Thickness.	Length.	Breadth.	Depth.	Length.	Breadth.	Depth.	Length.	Breadth.	Thickness.	Length.	Breadth.	Depth at front.	do. rear.	Length.	Breadth.	Depth at front.	do. rear.	Length.	Breadth.	Thickness.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
13½	12½	30	3	2½	1½	19⅝	16⅝	13¼	21¾	18⅝	14¼	22¾	19¼	1	24	8	5	8½	25½	9¾	5¾	10⅛	27	11	0⅞
13½	12½	30	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	12½	30	3	2½	1½	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

TABLE No. 4.

Dimensions of a Medium Transport Carriage.

Height of wheels.		Length from point of pole to the rear of the Carriage.		Length of the Axletree from point to point.		Total Weight.		
feet.	ins.	feet.	inches.	feet.	inches.	cwt.	qrs.	lbs.
6	8	17	0	7	8	21	1	20

TABLE No. 5.

Shewing the weight of Siege Ordnance and Carriages, also Mortar Beds, together with the number of Bullocks required for the draft of each.

	Weight.									No. of Bullocks required for draft.	
	Gun, Howitzer or Mortar.			Carriages or Beds.			Total.			For Guns and Carriages.	For a spare Carriage.
	cwt.	qr	lb	cwt.	qr	lb	cwt.	qr	lb		
24 Pounder Iron...........	49	2	0	38	0	0	87	2	0	26	22
18 .....,,........,, ...	40	0	0	37	0	0	77	0	0	22	18
10 inch Howitzer Iron.....	39	3	2	51	0	0	90	3	2	26	22
8...,,...... ,,......,,.........	20	3	17	43	0	0	63	3	17	22	18
10...,,......Mortar..,,.........	16	2	2	23	0	0	39	2	2	0	0
8...,,.......,,........,,.........	8	0	25	11	1	0	19	1	25	0	0
5½ ..,,.........,,.....Brass......	1	2	4	2	1	0	3	3	4	0	0
Carriage, Cart Artificers...	0	0	0	0	0	0	0	0	0	6	0
Carriage Cart Platform with Platform Limber..	0	0	0	0	0	0	0	0	0	6	6
Carriage Cart store with Gun Limber............	0	0	0	0	0	0	0	0	0	6	0
Car. Transport Medium...	0	0	0	0	0	0	0	0	0	12	0

In addition to the full complement of Bullocks for each Train, at the ate above laid down, ⅙th more are allowed as spare.

TABLE No. 6.

Shewing the full complement of Bullocks required for different sized Trains.

	Train No. 1.		Train No. 2.		Train No. 3.	
	Number of Carriages.	Number of Bullocks.	Number of Carriages.	Number of Bullocks.	Number of Carriages	Number of Bullocks.
24 Pounders at 26 each.	12	312	6	156	4	104
Spare Carriages „ 22 „	2	44	1	22	0	0
18 Pounders „ 22 „	12	264	6	132	4	88
Spare Carriages „ 18 „	2	36	1	18	0	0
10 inch Howitzers 26 „	4	104	2	52	1	26
Spare Carriages „ 22 „	1	22	0	0	0	0
8 inch Howitzers 22 „	6	132	4	88	2	44
Spare Carriages „ 18 „	1	18	1	18	0	0
Carts Artificers „ 6 „	6	36	4	24	2	12
Carts Platform, with platform Limber at 6 each.	23	138	13	78	8	48
Spare Platform Carts at 6 each.	4	24	2	12	1	6
Carts Store, with Gun limber 6 „	24	144	12	72	6	36
Carriages, Transport Medium 12 each.	3	36	2	24	1	12
Ammunition Waggon at 6 „	To be added agreeably to No. of Carriages.					
Total.	...	1310	...	696	...	376
Add $\frac{1}{6}$th spare...	...	218	...	116	...	62
Grand Total not including Bullocks for Ammunition Waggons, which must be added according to the number of Waggons....	1528		812		438	

N. B. The above is of course independent of the Hackeries and Bullocks that will be required for the conveyance of Stores.

(Signed)
S. Shaw, Lieut. Col.
R. Powney, Lieut. Col. P. C. O.
G. N. C. Campbell, Major.
R. G. Roberts, Capt.
A. Wilson, Capt.

List of implements shewing

IMPLEMENTS.	Train No. 1,						
	Guns.		Howzr		Mortars.		
	24 Pounder.	18 Pounder.	10 Inch.	8 Inch.	10 Inch.	8 Inch.	5½ inch.
Aprons, Canvas Gun	12	12	4	6	0	0	0
Bits, Gimblet	12	12	4	6	4	10	10
Bits, Gun	12	12	4	6	4	10	10
Boxes, Store	12	12	4	6	0	0	0
Boxes, Tube with waist belt	12	12	4	6	4	10	10
Buckets, water gun	12	12	4	6	4	10	10
Caps, canvas for Spunges	24	24	8	12	8	20	20
Caps, canvas for Howitzer and Mortar muzzles	0	0	4	6	4	10	10
Cases, tin portfire with slings	12	12	4	6	4	10	10
Chains, draft pole	12	12	4	6	0	0	0
Chains, draft leading	144	120	48	60	0	0	0
Chains, locking	12	12	4	6	0	0	0
Clip-band, pole yoke	24	24	8	12	0	0	0
Clippers, portfire on blocks	12	12	4	6	4	10	10
Drag-ropes, common with chains, sets	24	24	8	12	0	0	0
Drifts, vent	12	12	4	6	4	10	10
Esses, iron	72	72	24	36	0	0	0
Hammers, claw with Turnscrew	12	12	4	6	4	10	10
Hammers, wrench	12	12	4	6	4	10	10
Handspikes, common	48	48	16	24	0	0	20
Handspikes, traversing	48	48	0	0	0	0	0
Handspikes, Iron	0	0	0	0	8	20	0
Hatchets, hand	12	12	4	6	4	10	10
Kegs, for Tar and Grease	12	12	4	6	0	0	0
Keys, for cap squares	72	72	24	36	0	0	0
Ladles, with Wad hooks	12	12	0	0	0	0	0
Linch pins	72	72	24	36	0	0	0
Linstocks, with cocks	6	6	2	3	2	5	5
Pouches, priming	12	12	4	6	0	0	0
Pouches, common	24	24	8	12	8	20	20
Screws, elevating	12	12	4	6	0	0	10
Sights, Gunners	12	12	0	0	0	0	0
Spikes, gun jagged	24	24	8	12	8	20	20
Spikes, gun spring with reliever	24	24	8	12	0	0	0
Spunges, with rammer heads	24	24	8	12	8	20	20
Spunges, washing	12	12	0	0	0	0	0
Tompions, with collars	12	12	0	0	0	0	0
Washers, drag	60	60	20	30	0	0	0
Wires, priming	24	24	8	12	8	20	20
Wrenches, common	12	12	4	6	0	0	0
Yokes, Pole or Trace	156	132	52	66	0	0	0

the quantity allowed for Trains No. 1-2 *and* 3.

Train No. 2.							Train No. 3.							REMARKS.
Guns		How.		Mortars			Guns		How.		Mortars.			
24 Pounder.	18 Pounder.	10 Inch.	8 Inch.	10 Inch.	8 Inch.	5½ Inch.	24 Pounder.	18 Pounder.	10 Inch.	8 Inch.	10 Inch.	8 Inch.	5½ Inch.	
6	6	2	4	0	0	0	4	4	1	2	0	0	0	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
6	6	2	4	0	0	0	4	4	1	2	0	0	0	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
12	12	4	8	4	12	12	8	8	2	4	2	8	8	
0	0	2	4	2	6	6	0	0	1	2	1	4	4	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
6	6	2	4	0	0	0	4	4	1	2	0	0	0	For chains for spare Carriages & spare Bullocks, see under head "Spare Carriages."
72	60	24	40	0	0	0	48	40	12	20	0	0	0	
6	6	2	4	0	0	0	4	4	1	2	0	0	0	
12	12	4	8	0	0	0	8	8	2	4	0	0	0	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
12	12	4	8	0	0	0	8	8	2	4	0	0	0	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
36	36	12	24	0	0	0	21	24	6	12	0	0	0	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
24	24	8	16	0	0	12	16	16	4	8	0	0	8	
24	24	0	0	0	0	0	16	16	0	0	0	0	0	
0	0	0	0	4	12	0	0	0	0	0	2	8	0	
6	6	2	4	2	6	6	4	4	1	2	1	4	4	
6	6	2	4	0	0	0	4	4	1	2	0	0	0	
36	36	12	24	0	0	0	24	24	6	12	0	0	0	
6	6	0	0	0	0	0	4	4	0	0	0	0	0	Including those attached to Carriages.
36	36	12	24	0	0	0	24	24	6	12	0	0	0	
3	3	1	2	1	3	3	2	2	1	1	0	2	2	Including those attached to Carriages.
6	6	2	4	0	0	0	4	4	1	2	0	0	0	
12	12	4	8	4	12	12	8	8	2	4	2	8	8	
6	6	2	4	0	0	6	4	4	1	2	0	0	4	
6	6	0	0	0	0	0	4	4	0	0	0	0	0	Attached to Carriages.
12	12	4	8	4	12	12	8	8	2	4	2	8	8	
12	12	4	8	0	0	0	8	8	2	4	0	0	0	
12	12	4	8	4	12	12	8	8	2	4	2	8	8	
6	6	0	0	0	0	0	4	4	0	0	0	0	0	
6	6	0	0	0	0	0	4	4	0	0	0	0	0	
30	30	10	20	0	0	0	20	20	5	10	0	0	0	
2	12	4	8	4	12	12	8	8	2	4	2	8	8	Including those attached to Carriages; for the number for Carts and spare Carriages, see under head "Carriages, Carts, &c."
16	6	2	4	0	0	0	4	4	1	2	0	0	0	
78	66	26	44	0	0	0	52	44	13	22	0	0	0	

EXPLANATORY TABLES.

Aprons Gun, or Howitzer.

Canvas Aprons painted a lead color so as to be impervious to wet are used to cover the vents of guns and howitzers, to prevent the charge from being injured by wet, or the vent choked by dust.

Soap should always be used with the first coat of paint or priming, at the rate of 1lb. of soap to 20lbs. of paint.

These articles are made up in Magazines.

One size is used for all Siege guns, and one is allowed to every gun or howitzer equipped for service.

Dimensions.														Materials.				
Before Painting.							After Painting.							For Making.		For Painting.		
Vent cover		Tangent scale cover.		Lashing.			Vent cover.		Tangent scale cover.									
Length.	Breadth.	Centre.	Ends.	Front.	Rear.	Diameter.	Length.	Breadth.	Centre.	Ends.	Weight when Painted.			Canvas Europe fine.	Twine Europe fine.	Priming.	1st Coat.	2d Coat.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.	ozs.	drs.	ins.	drs.	ozs.	ozs.	ozs.
30	16	5	11½	116	72	7	29½	16	5	11	2	2	0	31	¾	11	3	1½

Bits, Gimblet or Gun.

These articles like the Vent Drift, are used for clearing the vents of pieces of Ordnance when choked.

One of each is allowed for every piece of Ordnance and is carried in the store box.

They are made up in Magazines.

	Total Length.	Length of bit.	Length of handle.	Diameter of handle or ring.	Diameter of bit.	Weight.	
	ins.	ins.	ins.	ins.	ins.	ozs.	drs.
Gimblet Bit	14	12	2·7	1½	·2	1	8
Gun Bit	14	12	2·	1½	·2	1	8

Box Store.

The store box for siege guns and howitzers is carried between the cheeks of the carriage.

It is used to carry small stores, such as hammers, wrenches, esses, washers &c. and will answer to convey ammunition from the Magazine to the guns in battery.

They are made up at the Gun Carriage Agencies, one is allowed for each gun or howitzer carriage, and requires the following half wrought materials.

2 Sides.
2 Ends.
1 Bottom.
2 Lid pieces.
2 Lid end pieces.

Box Handles			Interior Size.			Side.			End.			Bottom.			Corner Clamps.			
Length.	Breadth.	Thickness.	Length.	Breadth.	Depth.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Length.	Breadth.	Thickness.	Weight.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
34	2½	1¾	20	13¼	11¼	21	12	¾	13	½2	¾	21	14	¾	9	1	⅛	13

Box Tube with Waist Belt.

This article is used to hold tubes for priming the guns, when priming powder is not used, and for quick match for priming mortars.

The ventsman fastens it round his waist by means of a belt, the box being placed at his right side, and the belt buckled.

It is made up in Magazines of strong sheet tin, and the belt of good bullock's hide, and buckle of iron.

One is allowed to every gun, howitzer, or mortar, and is carried on the march in the Store Carts.

Interior Measurement.			Waist Belt.			
Length.	Breadth.	Depth.	Length.	Breadth.	Thickness.	Weight
ins.	ins.	ins.	ins.	ins.	ins.	lbs.
6	3	4	48	1	·1	1⅛

Number allowed for the whole Train.		Total Weight.
		lbs.
No. 1. Train.	58	65
No. 2. Train.	32	36¼
No. 3. Train.	20	22

Bucket Water Gun.

Is used to hold water for washing the gun, watering the cattle, and other purposes.

The block to which the portfire clippers are attached also fits into the top, so that when the portfire is put out, the part cut off falls at once into the water contained in the bucket.

One is allowed to every piece of Ordnance equipped for service, and is carried slung on a hook fixed under the breast transom of the Carriage.

They are made up at the Gun Carriage Agencies, or in Magazines.

Interior Size.			Stave.			Bottom.		
Depth.	Diameter at top.	Diameter at Bottom.	Length.	Breadth.	Thickness.	Diameter.	Thickness.	Weight.
Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	Inches.	lbs.
9	9¼	8	10	3	½	8½	¾	8¼

Caps Canvass for Spunges.

Used to cover the spunge heads to preserve them from dirt and wet.

They are made up in Magazines of No. 1. canvas, and are painted the same as gun aprons.

One is allowed for every spunge head.

Nature.	Dimens.		Lashings.			Materials.				Total Weight.		
	Length.	Breadth.	Length.	Diameter.	Weight.	Canvas.	Twine.	Paint.				
	ins.	ins.	ins.	ins.	ozs.	ins.	drs.	ozs.	drs.	lbs.	ozs.	drs.
24 and 18 Pounder gun.........	12	11	39	·1	8	12	½		6	0	12	0
10 inch Howitzer iron...........	18.3	16·5	64	·1	20	36	3½	13	10	1	9	8
8 inch Howitzer iron............	12	15·8	46	·1	8	27	2	8	9	1	0	12
Mortars, 10- 8 or 5½ inch........	12	11	39	·1	8	12	½		6	0	12	0

Chain Draft Pole

One is allowed to every Carriage, the long branches attached
The howitzer pole draft chain is made in two pieces, which are
they are connected by a snake hook which is easily unlocked
dimensions laid down in the undermentioned table, and should be
in Magazines.

	Chain.					Snake Hook.				
	Total length of chain including axletree, and yoke branches.	Length of parts.				Length.	Thickness of Metal.	Locking link.		
		Length of the chief chain, not including rings.	Length of the inferior chain, including snake hook rings.	Total length of yoke branch, including the branch and hook rings.	Total length of axletree branch, including the branch and hook rings.			Exterior diameter of.	Interior diameter of.	Thickness of rod iron used.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
24 or 18 Pounder.. ...	236	183·5	0	17·5	38·5	0	0	0	0	0
10 inch iron howitzer.	218·3	155	39	17·5	38·5	11	1	8·7	7·2	·75
8...,,.. ,, ...,,.....	218·1	149·4	24	17·5	38·5	11	1	8·7	7·2	·75
Siege Train Cart with Limber...... ...	206	94·0	0	19	95·0	0	0	0	0	0
Light Gun and Cart without Limber.:..	128·5	91·5	0	15½	24·0	0	0	0	0	0
Transport Carriage ..	213·5	163·1	0	17·5	38 5	0	0	0	0	0

Yoke Siege Gun.

to the chief chain, hook on to the Carr
distinguished in the Table below, by th
when requisite to unlimber. The
as nearly alike as possible.—They can

Rings.										
Snake Hook.						Yoke and axletree hook or ring.			Yo bran	
Attached to chain			Locking ring.							
Exterior diameter of.	Interior diameter of.	Thickness of rod iron used.	Exterior diameter of.	Interior diameter of.	Thickness of rod iron used.	Exterior diameter of.	Interior diameter of.	Thickness of rod iron used.	Exterior diameter of.	
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	
0	0	0	0	0	0	4	2·25	·875	5·1	3
4	2·5	·75	3	2	·75	4	2·25	·875	5·1	3.
4	2·5	·75	3	1·5	·75	4	2·25	·875	5·1	3
0	0	0	0	0	0	3·25	2·0	·625	4·5	
0	0	0	0	0	0	3·25	2·0	·625	4·5	
0	0	0	0	0	0	4	2·25	·875	5·1	3

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Are used, whole
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They are is un-
the same w
One is al

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2

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blocks
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about

24 Pounder
18 Pounder
10 Inch Iro
8 ,, ,,
5½ Inch Bras

y piece
h guns,
kets for

Are used
Two are a

	Total weight of block and clippers.	
		oz.
Train No. 1	3	11
...,,.. No. 2		
...,,... No. 3.		

Canvas, Muzzle Gun, Mortar, and Howitzer.

Ol for covering the muzzles of mortars and howitzers to
t and dirt getting into the bore of the piece.
The made up in Magazines of No. 1 canvas, and painted in
theyay as gun aprons.
dimlowed for every mortar and howitzer.
in M

	Dimensions.		Lashing.		Quantities of materials for making.					Weight.		
	Diameter of Circular part.	Breadth of Rim.	Length.	Diameter.	Canvas.	Twine Country.	Paint.					
	ins.	ins.	ins.	ins.	ins.	ozs.	lbs.	oz.	drs.	lbs.	ozs.	drs.
Iron Gun.... Iron Gun....	14·5	10	126	·1	42	5½	0	15	0	1	14	0
ı Howr. or Mor.	22	4·5	144	·1	45	8	1	3	6	2	2	8
" "	17·5	4·5	112	·1	33	5½	0	14	1	1	10	8
s Mortar......	9·3	4	68	·1	12	2¼	0	5	0	0	10	8

Cases Tin Portfire with Slings.

to hold Portfires.

llowed to each piece of Ordnance.

24 or
10 inc
8...,
Siege
Li
Light
wit
Trans

	Length.	Diameter.	Total weight with each Train.
	Inches.	Inches.	lbs.
....	18	3	174
....			96
....			60

Clip Band, Pole Yoke.

This article is fixed to pole and yoke, to the former by a ring, and to the latter by a broad bolt with nut at the end. The ring answers the purpose of the old swivel, it is necessary in fixing the pole chain, to shorten it up so tight (with this clip-band) the whole draft comes on the chain, and not on the pole—the clip-band should not be able to be taken off the pole, until the chain is unhooked.

Band.							Bolt.			Nut.		Ring.			Weight.	
Side.			Bottom.			Neck										
Exterior length.	Breadth.	Thickness.	Exterior length.	Breadth.	Thickness.	Diameter of iron.	Length.	Breadth.	Thickness.	Diameter.	Thickness.	Interior Diameter.	Diameter of Iron.	Diameter of neck.		
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.	oz.
4.3	2½	3⅛	3½	2½	3⅛	·8	4¾	1·3	·4	1	·4	3·3	·6	2·	4	2

Clippers Portfire, on Blocks.

Portfire clippers used with siege trains are exactly similar to those used with field batteries, but instead of being fixed to the off side of the gun carriage, are attached to semi-circular blocks of wood that fit into the water buckets, the upper part projecting a little so as to rest on the top of the bucket staves.

The clippers should not be fixed parallel to the ends of the block, but the handles lowered so as to form an angle of about 20 degrees with the bottom of the block.

They are made in Magazines, and one is allowed for every piece of Ordnance. They can be carried in the store box, with guns, and howitzers, and secured on the platform cart with buckets for mortars.

Clippers.							**Block.**					Total weight of block and clippers.	
							Thickness.						
Total length.	Length of handle.	Length of under plate.	Thickness.	Diameter of mouth.	Weight.		Above the bucket.	In the bucket.	Total.	Weight.			
ins.	ins.	ins.	ins.	ins.	lbs.	oz.	ins.	ins.	ins.	lbs.	oz.	lbs.	oz.
16	11	7	3⅛	1½	4	8	2	2½	4½	4	3	8	11

Chain Draft

Vide Note, Chain Draft

One kind of leading Chain answers for all descriptions of siege Artificers, or Platform Carts, the latter being the same as those

	CHAIN.		
		Length of parts.	
	Total length of chain including hook and yoke branches.	Length of the chief chain.	Total length of yoke branch including the branch and hook rings.
	Inches.	Inches.	Inches.
24 or 18 Pdr. Gun, 10 or 8 inch howzr. siege	108	87	17·5
Field Gun or Train Cart	104	86	15·5

Leading Yoke Siege.

Pole Yoke Siege.

Ordnance gun and howitzer carriages, and one for all Store, used with field batteries, when drawn by bullocks.

RINGS.									Dimensions and No. of links.							
Yoke Hook.			Yoke branch.			Hook.										
Exterior diameter of	Interior diameter of	Thickness of rod iron used for	Exterior diameter of	Interior diameter of	Thickness of rod iron used for	Exterior length of	From the eye to the interior of circular end	Thickness	Number of in chief chain	Number of in yoke branch	Exterior breadth of	Interior breadth of	Exterior length of	Interior length of	Thickness of rod iron used	Total weight of chain
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	No.	No.	ins.	ins.	ins.	ins.	ins.	lbs.
4	2·25	·875	5·1	3·35	·875	7·0	4·7	·875	17	2	2·6	1·1	6·6	5·1	·75	42
3	2·	·5	4·5	2·35	·625	5·2	3·0	·75	19	2	2·5	1·5	5·5	4·5	·5	18½

Chains

Are used to lock carriage wheels when passing down steep

At one end of the chain is a common hook that hooks into an a snake hook attached by a ring to a long link, on which is

To lock a wheel, the snake hook end of the chain is passed on one of the common links of the chain at any convenient fixed by the ring on the long link.

The locking chain can at all times be cast loose, however tight link that confines the snake hook.

One chain is allowed to every siege carriage, and are all on cription of carriage they are intended for.

They can be made up in Magazines.

N. B. The locking chain in field carriages is of the same diter having five more links.

	Snake hook link.			Snake hook.		
	Exterior length	Exterior breadth	Diameter of iron rod.	Length.	Length of neck and eye	Diameter of iron at the thickest part
	ins.	ins.	ins.	ins.	ins.	ins.
24 or 18 pounder....................	7·6	2·5	·625	9½	3	1
10 inch howitzer................	7·6	2·5	·625	9½	3	1
8 " "	7·6	2·5	·625	9½	3	1
Siege train cart..................	·7	2·5	·5	9	3	·8

Locking.

places, such as banks of nullahs, &c.

eye placed in some convenient part of the carriage, and at the other another ring of the same size.

between two of the spokes and round the felloe, and a ring placed distance, receives the snake hook, which is then doubled back and

the chain may be drawn, by pushing back the ring on the long

the same principle, but vary a little in size, according to the des-

mensions as laid down below for siege train cart, excepting the lat-

Rings		Common hook.			Chief chain.					
Exterior diameter.	Diameter of iron rod.	Exterior length including eye.	Exterior breadth.	Diameter of iron at the thickest part.	Exterior length of links.	Exterior breadth.	Diameter of iron rod.	Number of links not including snake hook.	Total length of chain including the common, but not the snake hook or link.	Total weight.
ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	no.	ins.	lbs.
3	·625	5·7	3	·9	3·45	1·9	·5	48	121	27
3	·625	5.7	3	·9	2·9	1·9	·5	42	84	22
3	·625	5·7	3	·9	2·9	1·9	·5	37	75	20
3	·5	5·7	3	·9	2·9	1·9	·5	40	80	21

Coins for Mortars.

Are used with cast iron mortars instead of screws for the elevation of the piece.—Two are allowed for each mortar, one giving an elevation of 45 degrees, the other of 30, and used together 75 degrees.

They are solid blocks of wood, having an oblong and flat base, with 4 perpendicular sides, one of the long sides being so much higher than its opposite, as to give the necessary inclination for the elevation required, the upper side of the coin is also a little hollowed out, to the shape of the mortar.

Two iron pins are fixed by strong iron clamps or braces to the bottom of the coins, which fit into holes made into the bed for their reception. Two holes strengthened by iron clamps, are also made in the inclined face of the 45° coin, to receive the connecting pins of the 30° coin, when an elevation of 75 degrees is required.

A ring is also fixed by a stud, to the ends of each coin, and two links (made circular at one end and large enough to go over the traversing bolts of the bed) accompany each mortar. To these links, a length of ratline or other rope is attached, which being passed through the rings and fastened, is a further preventive to the coins slipping.

They are either sent from Europe, or made up at the Gun Carriage Agencies, and are carried with the mortar beds. The brass 5½ inch mortar beds have only one coin, which is used over the elevating board.

		Dimensions of Coin.						Clamps or braces.				Exterior diameter of rings.	Diameter of circular part of link.	Breadth of neck of link.	Thickness of iron rod for links and rings.	Length of rope or ratline.	Weight.
				Height.				Upper.		Lower.							
				Low side.		High side.											
		Length.	Breadth.	At end.	At centre.	At end.	At centre.	Length.	Breadth.	Length.	Breadth.						
		ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
10inch	45°	22	12	4	2·7	11·5	10·5	11	2·2	15·3	2·2	4·	4·2	3	·5	96	58
	30°	20·5	11·5	4	2·5	9·4	6·4	0	0.	12·8	2·2	4·	4·2		·5		37
8 inch	45°	17·8	10·3	4·4	3·9	10·4	9·1	10·7	2·	9·7	2·	4·	4.	2·4	·5	48	35
	30°	16·8	9·	2·4	2.3	8·2	7.	0	0	10·2	2·	4	4·		·5		22

Drag Ropes.

Are used to move the ordnance and carriages where bullocks cannot be employed ;—they are also useful in letting the carriages down steeps, such as banks of nullahs &c. when locking chains are not used. They are made up in Magazines from Europe 4 inch rope, and at one end have a chain fixed to them, as the wheels of the carriage would otherwise soon cut through the rope.

A set consists of two ropes, and every piece of Ordnance is furnished with two sets, and every cart and spare carriage with one set. They are carried on the spare carriages, or on carts, but in such a situation that they may be easily got at if required.

Rope.			Chains.				Hooks.		Thimbles.			
Circumference of	Length of	Weight of	Length of links	Diameter of iron rod	Number of links	Length of chain with hook attached	Length of	Thickness of	Diameter of	Thickness of	Total length.	Total weight.
ins.	feet.	lbs.	ins.	ins.	No.	ins.	ins	ins.	ins.	ins.	feet.	lbs.
4	58	42	2	0·4	15	36	6	1	2·5	1·6	60	54

Drift Gun or Vent.

Is a punch used to clear the vent of the piece when choked, and should be made of good hammered steel.

One is allowed for every piece of ordnance, and is carried in the store box.

They are made up in Magazines

Total length	Length of drift	Length of head	Breadth of head	Diameter of bit	Weight
ins.	ins.	ins.	ins.	ins-	ozs
13½	12	1½	½	·2	2¼

Esses Iron.

Used to unite broken chain traces, prolongs drag, &c. they are made like the letter S. with holes to receive a leather thong.

Six are allowed for each gun or howitzer carriage, and two for every other siege train carriage.

They are carried in the store box, and are made up in Magazines·

Length	Breadth	Thickness of metal	Weight.
ins.	ins.	ins.	ozs.
5½	·3¾	⅝	13½

Hammer Claw and Wrench.

	Head.	Handle.		Turn screw.				
	Length.	Diameter.	Length.	Length.	Breadth at shoulder.	Breadth at point.	Thickness.	Weight.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Hammer claw............	5⅝	3⅜	13⅝	3	1	½	¼	3

These articles are used for tightening bolts, taking out pins, keys, and bolts: driving nails &c. they can be made in Magazines, the turn screw of steel; and the jaws, face, and claws of the hammers well steeled.

One of each is allowed to every piece of Ordnance, and is carried in the store box.

	Length of head	Breadth of head	Thickness of head	Length of main square bar	Length of screw part	Thickness of bar	Breadth of bar	Diameter of screw made	Diameter of handle	Length of handle	Total length	Weight
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Hammer wrench............	5	1	1	6¼	5	½	½	⅓	1¼	5½	12¾	4

Handspike Common.

Used to assist in traversing the gun, and as occasion may require in raising and turning heavy stores, and in slinging ammunition boxes, and in taking off wheels.

They can be made up in Magazines of any strong elastic wood (Soondry, or Saul answer well).

These handspikes should be invariably cased with sheet iron, at the purchase or pointed end.

Four are allowed for every gun or howitzer carriage. Two are carried on the gun carriage, and two in the store carts.

	Length	Length of square part	Length of round part	Thickness of square part	Diameter at round end not square	Length of the bevil of the point	Weight
	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Handspike..........	72	24	48	3	2½	4	13½

Handspikes Traversing.

Are used with siege guns, and fit into iron rings attached to the trail of the gun carriage.

They are round and the diameter greater at about 18 inches from the trail end, than at any other part, the chief purchase being there.

They are made up in Magazines, or at the Gun Carriage Agencies, and four are allowed for each piece of Ordnance.

On the march two are carried hooked up to the cheeks of the carriage, and two on the store carts.

Length	Diameter at the trail end	Diameter of the swell	Diameter of the handle	Weight
feet.	ins.	ins.	ins.	lbs.
6	2·8	3·5	1·7	14

Handspikes Iron.

Are used with iron mortar beds, two are allowed to each mortar.

They are carried on the march slung to the frame work of the carriage that conveys the mortar, and a ring is attached to the handle end, to secure it by lashing.

One end is made square, and a little curved, and the point sloped off so as to go well under the bed bolt, when traversing.

	Round part		Square part				
					Thickness.		
Total length	Diameter at handle	Diameter close to square part	Length	Breadth	At centre	At end	Weight
feet.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
4½	1·0	1·5	11	2	1·25	1·5	24

Hatchets Hand.

Can be made up in Magazines.

One is allowed for every piece of Ordnance, and carried in the store box.

Hatchet.			Eye.		Handle.				
Length of the edge	Length of end at the eye.	Thickness of the end at the eye.	Length	Breadth	Length	Breadth at broad end	Breadth at small end	Weight	
Ins.	Ins.	Ins.	ins.	ins.	ins.	ins.	ins.	lbs.	ozs.
5·4	1·85	·85	2·2	·75	15	2·15	1·7	1	14½

Kegs Grease.

This Keg is filled with grease, the iron axletrees of carriages ought to be particularly looked after, and greased every day if needful.

One is allowed to every siege carriage or cart, one-third of tar and two-thirds of grease, but nothing can be more injurious to wheels, than to use tar only, it hardens on the axle, and adds greatly to the friction.

	Interior size.			Staves.				Ends.			Weight.			
	Length.	Diameter at middle.	Diameter at ends.	Length.	Breadth.	Thickness.	Number to one barrel.	Diameter.	Thickness.	Number for one barrel.	Empty.		Filled.	
	ins.	ins.	ins.	ins.	ins.	ins.	No.	ins.	ins	No.	lbs.	ozs.	lbs.	ozs.
Keg..	$9\frac{1}{4}$	$8\frac{1}{4}$	7	13	3	$\frac{5}{8}$	11	$8\frac{1}{2}$	$\frac{5}{8}$	2	13—	„	23—	„

Keys for Capsquares.

Are fixed in the eye of the eye bolts, to keep the cap-squares down. They are attached to the carriage by small chains, and are sent with carriages from the agency yards, but may be made in Magazines.

Two spare with chains are allowed to every 24 and 18 pounder, or 10 and 8 inch howitzer carriage, and are carried in the store box.

Ladles and Wadhooks.

The ladle is fixed to one end, and the Wadhook to the opposite end of a staff. They are made up in Magazines.

One is allowed to every four guns, and are carried in the store cart.

	Copper Ladle.		Wadhook.		Staff.		
	Length.	Diameter.	Length.	Diameter.	Length.	Diameter.	Weight.
	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
24 Pounder	20	5·5	12	4	120	1·5	20
18 ...„	20	5·	12	4	120	1·5	15

Linch Pins.

Are used at the end of the axletree arm, to prevent the wheel falling off. Two spare are allowed for every four wheeled carriage, and one for every carriage with two wheels.

They are made up in Magazines.

	Head			Pin			Weight.
	Length	Breadth	Thickness	Length	Breadth	Thickness	
	ins.	ins.	ins.	ins.	ins.	ins.	ozs.
Linch Pin	1½	1	1	4·25	1	4·5	12

Linstocks with Cocks.

Are used to hold the lighted slow match.

One is allowed for every two pieces of Ordnance, and are carried in the store carts.

Diameter	Length of			Total length	Weight
	Cock	Spike	Stock		
Inches.	Inches.	Inches.	Inches.	Inches.	lbs.ozs.
8	9	4½	36	46	2 5

Pouches Common.

Are made for holding cartridges. Two are allowed for each piece of Ordnance.

Pouch.		Bearing strap.		Weight.	Total weight with each train.
Depth.	Breadth.	Length.	Breadth.	lbs.	lbs.
Inches.	Inches.	Inches.	Inches.		
22	20	60	3	3	No. 1.—348. „ 2.—192. „ 3.—120.

Pouch Priming.

The priming pouch is to be made of leather, very closely and nicely sewed, the strap may be made of leather, or country tape, whichever is most conveniently to be obtained. Two small spike pouches are sewed upon the face of the priming pouch to hold two gun spikes. The priming pouches are to be made up in Magazines. One is allowed for every piece equipped for service, and carried in the store box.

	Pouch.			Strap including the buckle.		
	Depth.	Breadth.	Thickness.	Length.	Breadth.	Weight.
	ins.	ins.	ins.	ins.	ins.	ozs. drs.
Pouch priming...	8	8·5	2		1	10— 7

Elevating Screws for Siege Ordnance.

Elevating screws for siege Ordnance are made with capstan heads. The plate and female box are made of brass and are fixed in the centre transom of gun, and in the sliding transom of iron howitzer carriages.

In wooden mortar beds the screw is placed in the breast transom.

One is allowed for every gun carriage, and every wooden mortar bed.

	Screw Male.		Capstan head.		Handles		Brass box screw female.			
	Total length including capstan head.	Diameter.	Diameter.	Thickness.	Length from capstan head.	Diameter at thickest part.	Depth.	Exterior upper diameter.	Exterior middle diameter.	Exterior lower diameter.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.
Guns and howitzers....	14	2	3·6	2·5	5.	1·	3·5	6·8	3·8	3
5½ inch Mortars.....	9	1·5	3	1·5	2·25	0·7	2·8	5·15	3·	2·5

Sights Gunner.

Are thin flat pieces of metal made of various dimensions, with small holes bored thro' at equal distances, to assist the gunner in regulating the elevation. One is allowed for every gun.

They are made in Magazines.

Spikes Jagged and Spring.

Are made of steel, two of each are allowed for every piece of Ordnance equipped for service, and are used to close the vent when considered necessary to render Ordnance unserviceable.

The spring spike is used when guns are relinquished with an idea of shortly repossessing them, and jagged spike when they are entirely abandoned.

	Jagged				Spring			
		Diameter.			Length			
	Length	Large end	Small end	Weight	From under the head to the point of the spring	Total length from top of the head to the end of spike	Diameter	Weight
	ins.	ins.	ins.		ins.	ins.	ins.	
24 Pounder...........	4	0·3	0.1	about ¾ of an oz. or 22 to the lb. nearly	7·65	10·2	0·2	about 1½ oz. each or 11 to the lb. nearly.
18 Pounder					7·4	10·2	0·2	
10 inch howitzer...					8.35	11·0	0·2	
8 inch howitzer....					6·9	9·3	0 2	

Spunges with Rammers and Blocks for Spunge Heads.

Are made in Magazines. Two are allowed for every piece of ordnance equipped for service.

The rammer heads are hollowed out, so as not to hurt the fuze, when putting a shell home.

All mortar spunges are of the same size.

The second spunge will be carried on the store cart.

		Staves		Blocks for spunge head			Rammer head				
	Total length	Length	Diameter	Length	Diameter at small end	Diameter at thick end	Length	Diameter	Weight.		
	feet	feet.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.	ozs.	drs.
24 pounder iron gun.	11	10	1·5	6	2.6	3·6	6	5·5	10	1	14
18 „........„.....„..	11	10	1·5	6	2.5	3	6	5·0	9	10	12
10 inch howitzer.....	6	5	1·5	8	2	6	4	5·0	8	6	0
8 „..........„........	5	4·1	1·5	7	2	3	4	5·0	4	12	8
Mortars...................	4	3	1·5	7	1·5	2·5	4	3·3	3	8	0

Spunges Washing.

Are used in cleaning the bores of the guns after firing.

They are made from old junk, jute, or any other sort of refuse rope.

One is allowed for each gun.

	Number	Length of Handle	Weight	Total weight for each train
		feet.	lbs.	lbs.
Train No. 1..........	24	12	7	168
Train No. 2.........	12			84
Train No. 3..........	8			56

Tompions with Collars.

Are made up in Magazines, and are used to prevent dirt, &c. getting into the bores of guns. One is allowed for every gun equipped for service.—One iron buckle 3 inches long, attached to the 24 pdr. collar, is included in the weight and length, and an iron buckle 2½ inches long, attached to the collars of the 18 pdr., is included in the length and weight of this nature.

	Diameter				Breadth of						Length of						Weight of						
	Smallest		In front of Muzzle		Leather Collar		Leather Brace widest part		Leather Brace narrowest part		Collar		Leather Brace		Tompion		Collar		Tompion		Total Weight		
	Ins.	ths.	ins.	ths.	ins.	ths.	ins	ths.	ins.	ths	ft.	ins.	ft.	ins.	ins.	ths.	ozs.	drs.	lbs.	ozs.	lbs.	ozs	drs.
24 Pdr	5	7½	7	5	3	0	5	5	3	0	4	4	3	9	10	5	15	7	5	4	6	3	7
18 ,,	5	1	6	5	2	5	5	5	2	5	3	5	3	3	10	5	9	6	4	0	4	9	6

Washers Drag and Common.

Are the same with the exception of the eye to receive the hook of the drag rope.

All siege gun and howitzer carriages have washers of the same dimensions. Drag washers have hitherto been allowed for the gun carriage only, and the common washers for limber carriages and train carts, but as the drag washers are most convenient, they are here allowed for all descriptions of carriages.

One spare drag washer is allowed for each Ordnance carriage composing the train.

	Total length to end of eye.	Diameter of Washer.		Diameter of eye or drag loop.	Thickness.	Weight,	
		Interior.	Exterior.				
	ins.	ins.	ins.	ins.	ins.	lbs.	ozs.
Washer drag	9·5	3·5	5 4	1·5	1	4	13
„ common.........				0	0	3	14

Wires Priming.

This article is used to prick the cartridge before priming the piece, it is made of steel pointed at one end, and with a thumb ring on the other.

Two are allowed for every piece of Ordnance equipped for service.

They are made up in Magazines.

Length including Thumb ring.	Diameter.	Weight.	
Inches.	Inches.	lbs.	ozs.
15	·2	2	8

Wrenches Common

Are made up either at the Gun Carriage Agencies, or in Magazines. They are used for screwing up the bolt nuts on carriages, there should be two sizes with siege trains.

One is allowed for every gun and howitzer, and a small one for every train cart.

	Length.	Large Mouth wide.	Small Mouth wide.	Diameter of bar.	Weight.	
	ins.	ins.	ins.	ins.	lbs.	ozs.
Large........	43	3·2	2·5	1·25	19	12
Small............	24	2	1½	1·	7	0

Yoke Bullock Pole or Trace.

This article is required when bullocks are used as draft and answers either for pole or trace.

When used as a pole yoke, the clip band must be fixed to it, and when used as a trace yoke, the clip band is to be taken off, and put in the store box on the limber. When used as a pole yoke it is to be fastened to the pole by means of the yoke swivel pin being put through the pin holes in the clip band in front of the upper bar of the yoke, and is then secured by means of the swivel pin nut and forelock key. One is allowed for every pair of bullocks in draft, and one to every pair of spare bullocks.

The trace chain is invariably to be attached to the yoke.

They are made up in Magazines.

						Iron braces										
	Upper bar		Under bar.			Inner.		Outer link.		Iron ring.		Chain pin.		Trace hook.		
	Length	Square	Length	Breadth	Depth	Length	Diameter	Length	Diameter	Diameter interior	Thickness	Length	Diameter	Length	Diameter of iron	Weight
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Yoke Bullock ... Pole or Trace..	72	3	72	2½	2	19	½	17	½	3¾	½	7	½	7½	⅝	38

(Signed)
S. **Shaw**, Lieut. Col.
R. **Powney**, Lieut. Col. P. C. O.
G. N. C. **Campbell**, Major.
R. G. **Roberts**, Capt.
A. **Wilson**, Capt.

(Signed) J. **Dashwood**,
Asst. Secy. Mily. Board.

LIST OF AMMUNITION AND LABORATORY STORES

AMMUNITION AND LABORATORY STORES.	Train No. 1.	
	Number.	Weight. lbs.
Powder, Ordnance	0	249600
,, Musketry	0	103900
,, Mealed	0	600
Shells, carcass filled 8 inch	250	12500
,, ,, ,, 5½ ,,	500	8000
Shells, common empty 10 ,,	8000	720000
,, ,, ,, 8 ,,	16000	704000
,, ,, ,, 5½ ,,	10000	155000
Shells, Shrapnell 24 pdr.	1200	25200
,, ,, 18 ,,	1200	18000
,, ,, Howitzer 8 inch	600	36000
Shot, round 24 pdr.	12000	288000
,, ,, 18 ,,	12000	216000
Shot, grape canister 24 ,,	900	22950
,, ,, ,, 18 ,,	900	19350
,, ,, ,, Howitzer 10 inch	400	41100
,, ,, ,, ,, 8 ,,	600	32512
Shot, grape coffin's 24 pdr,	300	8770
,, ,, ,, 18 ,,	300	6150
Antimony	—	—
Bags, cartridge, serge empty 24 pdr. ⅓d Shot's weight	13500	0
,, ,, ,, ⅙th ,, ,,	2700	0
,, ,, 18 pdr. ⅓d ,, ,,	13500	0
,, ,, ,, ⅙th ,, ,,	2700	0
,, ,, 10 inch howitzer	4950	0
,, ,, 8 ,, ,,	8100	0
,, ,, 10 ,, Mortar	4500	0
,, ,, 8 ,, ,,	11531	0
,, ,, 5½ ,, ,,	11813	0
Barrels, Bouge	34	655
Barrels, 100 lbs.	3535	116655
,, 60 lbs.	57	1254
Benches, Fuze with knife	17	1105
Blocks, Fuze driving	17	2074
,, ,, setting	17	4250
Boilers, copper sets	3	587
,, Iron ,,	3	1152
Borax	0	26
Boxes, packing for Spherical Case	550	15000
,, ,, Light Balls.	15	600
,, ,, Signal Rocket	3	87

SHEWING THE QUANTITY ALLOWED FOR TRAINS.

Train No. 2.		Train No. 3.		REMARKS.
Number.	Weight lbs.	Number.	Weight lbs.	
0	129500	0	82700	
0	60200	0	32400	
0	600	0	600	
150	7500	100	5000	
300	4800	200	3200	
4000	360000	2000	180000	
10000	440000	6000	264000	
6000	93000	4000	62000	
600	12600	4000	8400	
600	9000	400	6000	
400	24000	200	12000	
6000	144000	4000	96000	
6000	108000	4000	72000	
450	11475	300	8650	
450	9675	300	6450	
200	20550	100	10275	
400	21770	200	10885	
150	4385	100	2925	
150	3075	100	2050	
				For Carcasses & light balls see Explanatory Tables.
6750	0	4500	0	For Weight see under head "Serge for Cartridge Bags."
1350	0	900	0	
6750	0	4500	0	
1350	0	900	0	
2475	0	1238	0	
5400	0	2700	0	
2250	0	1125	0	
6919	0	4613	0	
7088	0	4725	0	
18	347	11	212	
1897	62601	1151	37983	
39	858	29	638	
9	585	6	392	
10	1220	6	732	
10	2500	6	1500	
2	391	1	196	
2	768	1	384	
0	16	0	8	
300	8300	184	5023	
8	320	5	200	
2	58	1	29	

AMMUNITION AND LABORATORY STORES.	Train No. 1.	
	Number.	Weight lbs.
Boxes, packing for Fuzes	95	4107
Brass, cast	0	58
„ Hammered	0	58
Brushes, Mealing Table	60	36
„ Hand	30	
„ Paint	17	0
Buntin ... yards	129	13½
Candles, wax	0	116
Cloths, Dosootie ... yards	200	93
Cloths, Powder	16	368
Flour	0	80
Formers, Cartridge ... 24 Pdr.	12	90
„ „ ... 18 „	12	
„ „ ... Howitzer 10 inch	4	
„ „ ... „ 8 „	6	
„ „ ... Mortar 10 „	4	
„ „ ... „ 8 „	10	
„ „ ... „ 5½ „	10	
Fuzes, spherical case 1st size.	720	40
„ „ „ 2d „ ... „	2880	95
„ common empty ... 10 inch	9600	3264
„ „ „ ... 8 „	19200	5280
„ „ „ ... 5½ „	12000	1620
Glue	0	58
Grease	—	—
Gunnies, double ... pieces	290	1305
Instruments, Gunner's sets ... Large	4	1582
Instruments, Gunner's sets ... Small	16	
Instruments, Fuze, driving, ... sets	—	—
Kit	0	102
Knives, Laboratory	58	15
Lanterns, tin	12	51
„ Dark	12	
„ Muscovy	12	
Lead	0	20
Light, Balls	150	900
Line, Log ... skeins	116	159
Match, Gun slow ... „	246	123
„ quick ... yards	31200	301
Measures, Powder ... sets	—	—
Mirror	—	—
Mixers, copper	12	24
Needles, sewing	1160	7½
„ Sail makers 1st size	290	
„ „ 2d „	290	
„ Packing	290	
Oil, Cocoanut	0	58
„ Mustard	0	187½
„ Linseed	0	178
Paddles pulverizing	18	94½

Train No. 2.		Train No. 3.		REMARKS.
Number.	Weight lbs.	Number.	Weight lbs.	
57	2469	32	1397	
0	32	0	20	
0	32	0	20	
40	24	24	14	
20		12		
9	0	6	0	See Paint prepared.
86	9	43	4½	
0	64	0	40	
150	70	100	46½	
10	230	5	115	
0	40	0	20	
6	48	4	29	
6		4		
2		1		
4		2		
2		1		
6		4		
6		4		
480	26	240	13	
1440	48	960	32	
4800	1632	2400	816	
12000	3300	7200	1980	
7200	972	4800	648	
0	32	0	20	
160	800	100	450	See explanatory Tables.
2	849	1	454	
9		5		
0	60	0	36	Included in Instruments Gunners.
32	6	20	4	
8	34	4	17	
8		4		
8		4		
0	15	0	10	
75	450	50	300	For quantity of different ingredients see explanatory Tables.
64	88	40	55	
132	66	84	42	
19200	185	11200	108	
8	16	4	8	Included in Instruments Gunners.
640	4	400	2½	
160		100		
160		100		

Turpentine...	0	85
Tables, Laboratory...	3	1008
„ Mealing...	3	558
Tallow..	0	80

AMMUNITION AND LABORATORY STORES.	Train No. 1.	
	Number.	Weight lbs.
Paint, prepared, Carriage	0	708½
Palms, steel	58	4½
Pans, copper, cooling	17	0
Paper, Europe portfire . . . Quires	58	392
„ Country „ . . . „	58	
„ „ Cartridge . . . „	222	
„ Europe Foolscap . . . „	58	
Pawlins, Magazine, large	30	5820
„ „ small	30	
„ „ Camel	30	
Pencils, black lead	58	0
Pendulums, Gunner's complete	6	84
Pestles and Mortars, brass . . . large	6	516
„ „ small	6	
Pincers, loading of sizes, Howitzer 10 inch	4	36
„ „ „ „ 8 „	6	43
„ „ „ Mortars	—	—
Pincers, Gun	58	116
Pitch	—	—
Portfires	6515	2138
Rockets, for Signals . . . 1 Pounder	150	178
Rockets, stick	—	—
Resin	—	—
Rubbers, hand, Mealing Table	6	72
Sal Ammoniac	0	29
Saltpetre pulverized	0	1800
Scales, large wooden	2	4536
„ „ copper	6	
„ medium „	6	
„ small „	6	
Scissors, Laboratory „	58	13
Searchers, with relievers	3	72
„ single prong	3	
Serge, for Cartridge Bags . . . pieces	233	7456
Sieves, Brass, 3 in a set . . . sets	6	113
„ Lawn „ . . . „	6	
„ Hair „ . . . „	3	
„ Leather, Top and receiver	3	
Sockets, Portfire with Handles	116	116
Solder, Pewter	0	87
Spirits of Wine . . . quarts	175	0
Sulphur, refined	0	1000

Train No. 2.		Train No. 3.		REMARKS.
Number.	Weight lbs.	Number.	Weight lbs.	
0	376½	0	230½	See explanatory Tables.
32	2½	20	1½	
10	0	6	0	
32	220	20	136	
32		20		
130		78		
32		20		
20	3380	10	1940	
20		10		
20		10		
32	0	20	0	Weight trifling.
4	56	2	28	
4	344	2	172	
4		2		
2	18	1	9	
4	29	2	14½	Included in Instruments Gunners.
32	64	20	40	For Carcasses, Light balls and Kit.
3582	1175	2240	735	For quantity of different materials, see explanatory Tables.
100	118	50	59	
				See Rocket Table.
				Used in Kit and Carcasses.
4	48	2	24	
0	16	0	10	
0	1100	0	700	For Fuzes, Quick Match & Carcasses.
1	2412	1	2134	
4		2		
4		2		
4		2		
32	7	20	4½	
2	48	1	24	
2		1		
126	4031	77	2464	This calculation is for loose Ammunition, when fixed Ammunition is used a larger quantity of Serge will be required; what is here allowed is sufficient to make up the full complement of cartridge bags as given under head "bags cartridge serge" a deduction must therefore be made for the

AMMUNITION AND LABORATORY STORES.	Train No. 1.	
	Number.	Weight. lbs.
Tents { Laboratory	2	0
Tents { European Non-Commissioned	10	0
Tents { Paals Sepoy	6	0
Thread, worsted	0	58
.... ,, .. cotton	0	39
.... ,, ... silk	0	77
Tubes, copper or quill	78180	440
Twine, country No. 1	0	110
.... ,, ... ,, ... No. 2	0	250
.... ,, ... ,, ... No. 3	0	50
Wads, round 24 Pounder	24000	48000
... ,, ... ,, ... 18 ... ,,	24000	
Wax, Bees	0	200
Wrappers Curwah 24 Pounder	4000	2240
.... ,, ... ,, ... 18 ..... ,,	4000	

Solder, Pewter...	0	87
Spirits of Wine.. ... quarts...	175	0
Sulphur, refined...	0	1000

Train No 2.		Train No. 3.		REMARKS.
Number.	Weight lbs.	Number.	Weight lbs.	
1	0	1	0	See explanatory Tables.
6	0	3	0	
4	0	2	0	
0	32	0	22	Required only when quill tubes are used.
0	24	0	14	For quick match.
0	43	0	26	For sewing cartridges.
43020	241	26880	151	When required, but at present tubes are not used
0	70	0	40	The country twine is sufficiently good, but Europe twine will answer the purpose.
0	150	0	90	
0	30	0	15	
12000	24000	8000	16000	
12000		8000		
0	110	0	60	
2000	1120	1350	756	
2000		1350		

EXPLANATORY TABLES.

AMMUNITION.

Under this head will be shewn the quantity of powder allowed for the train, whether for charges, fuzes, quick match, or carcasses, &c., also,

The proportion of shot, shells, grape, and carcasses.

In calculating the quantity of carriage that will be required, shrapnells, carcasses, &c. are supposed to be filled. In the list of Stores therefore, the weight of the fuzil balls, and materials for carcasses, &c., will not be given, but if required, will be found under its particular head in the Explanatory Tables.

Table No. 1, shews the number of rounds allowed, and the quantity of powder required for one piece of each nature.

Table No. 2, shews the total quantity of shot and shells for the whole train.

Table No. 3, shews the total quantity of powder required for the whole train.

AMMUNITION.

Table No. 1.

Shews the quantity of Shot and Shells allowed for one piece of Ordnance of each nature, the quantity and quality of the Powder required for the charge, of bursting Shells, and Priming.

Rounds allowed per piece.	NATURE OF ORDNANCE, AND THE PURPOSE FOR WHICH POWDER IS REQUIRED.	POWDER.			
		Particulars.		Total for each piece	
		Mus-ketry.	Ord-nance.	Mus-ketry.	Ord-nance.
		lbs.	lbs.	lbs.	lbs.
	24 PDR. IRON GUN.				
1000	Charge for Round Shot at 8lbs. each........	0	8000	0	0
100	„ Shrapnell Shells at 4lbs each.....	0	400	0	0
75	„ Canister Grape Shot at 4lbs. each.	0	300	0	0
25	„ Coffin's „ „ at 4lbs. each.	0	100	0	0
	Bursting Shrapnell at 6ozs. each............	37½	0	0	0
	Priming at one oz. each round.................	75	0	112½	8800
	18 PDR. IRON GUN.				
1000	Charge for Round Shot at 6lbs. each.........	0	6000	0	0
100	„ Shrapnell Shells at 3lbs. each....	0	300	0	0
75	„ Canister Grape Shot at 3lbs. each.	0	225	0	0
25	„ Coffin's „ „ at 3lbs. each.	0	75	0	0
	Bursting Shrapnell at 5ozs. each..........	31¼	0	0	0
	Priming at 1oz. each round.....	75	0	106¼	6600
	10 INCH IRON HOWITZER.				
1000	Charge for Common Shells at 8lbs. each.....	8000	0	0	0
100	„ Canister Grape at 8lbs. each	800	0	0	0
	Bursting Common Shells at 3lbs. each........	0	3000	0	0
	Priming at 1oz. each round	68¾	0	8868¾	3000
	8 INCH IRON HOWITZER.				
1000	Charge for Common Shells at 5lbs. each...	5000	0	0	0
100	„ Shrapnell „ at 5lbs. „ ...	500	0	0	0
100	„ Canister Grape at 5lbs. „ ...	500	0	0	0
	Bursting Common Shells at 2lbs. „ ..	0	2000	0	0
	„ Shrapnell „ at 15ozs. „ ..	93¾	0	0	0
	Priming at 1 oz. each round......................	75	0	6168¾	2000
	10 INCH IRON MORTAR.				
1000	Charge for Common Shells at 2lbs. each....	2000	0	0	0
	Bursting „ „ at 3lbs. „	0	3000	2000	3000
	8 INCH IRON MORTAR.				
1000	Charge for Common Shells at 1¼lb. each. ..	1250	0	0	0
25	„ Carcasses „ at 1¼lb. „	31¼	0	0	0
	Bursting Common Shells at 2lbs. „	0	2000	1281¼	2000
	5½ INCH BRASS MORTAR.				
1000	Charge for Common Shells at ¾lb. each......	750	0	0	0
50	„ Carcasses „ at ¾lb. „	37½	0	0	0
	Bursting Common Shells at ¾lb. „	0	750	787½	750

Table No. 2.

Shewing the total quantity of Shot, Shells &c. required for different sized Trains.

Nature of Shot and Shells.	Train No 1			Train No. 2			Train No. 3		
	No. of Guns &c.	Number of Rounds.	Weight. lbs.	Number of Guns &c.	Number of Rounds.	Weight. lbs.	Number of Guns &c.	Number of Rounds.	Weight. lbs.
Round Shot 24 Pdr.	12	12000	288000	6	6000	144000	4	4000	96000
„ 18 „	12	12000	216000	6	6000	108000	4	4000	72000
Shrapnell Shells 24 Pd.	0	12000	25200	6	600	12600	0	400	8400
„ „ 18 „	0	1200	18000	0	600	9000	0	400	6000
„ Howitzer 8 Inch	0	600	36000	0	400	24000	0	200	12000
Common „ 10 „	4	4000	360000	2	2000	180000	1	1000	90000
Shells „ 8 „	6	6000	264000	4	4000	176000	2	2000	88000
„ Mortars 10 „	4	4000	360000	2	2000	180000	1	1000	90000
„ „ 8 „	10	10000	440000	6	6000	264000	4	4000	176000
„ „ 5½ „	10	10000	155000	6	6000	93000	4	4000	62000
Carcasses Shell 8 „	0	250	12500	0	150	7500	0	100	5000
Mortar 5½ „	0	500	7900	0	300	4800	0	200	3200
24 Pdr. Canister Grape...	0	900	22950	0	450	11475	0	300	8650
24 Pdr. Coffin's Grape...	0	300	8770	0	150	4385	0	100	2925
18 Pdr. Canister Grape...	0	900	19350	0	450	9675	0	300	6450
18 Pdr. Coffin's Grape...	0	300	6150	0	150	3075	0	100	2050
Hr. 10 In. Canister Grape....	0	400	41100	0	200	20550	0	100	10275
Hr. 8 In. Canister Grape....	0	600	32512	0	400	21770	0	200	10885

Table No. 3.

Shewing the quantity of Musketry, Ordnance, and Mealed Powder required for different sized Trains.

Number, and Nature of Ordnance composing each Train.	Powder.			Total Weight of Powder, not including Barrels and Package.
	Musketry lbs.	Ordnance. lbs.	Mealed. lbs.	
TRAIN No. 1.				Musketry lbs. 103900 or Barrels 1039 Ordnance lbs. 249600 or Barrels 2496 Mealed lbs. 600 or Barrels 10 lbs. Total Weight 354100
Twelve. .24 Pounder	1350	105600		
Twelve.....18 „	1275	79200		
Four 10 inch How.	35475	12000		
Six 8 „ „	37013	12000		
Four 10 „ Mors.	8000	12000		
Ten 8 „ „	12813	20000		
Ten 5½ „ „	7875	7500		
For Fuzes Quick Match &c.	24	1300	600	
TRAIN No. 2.				Musketry lbs. 60200 or Barrels 602 Ordnance lbs. 129500 or Barrels 1295 Mealed lbs. 600 or Barrels 10 lbs. Total Weight 190300
Six 24 Pounders	675	52800		
Six 18 „	638	39600		
Two 10 inch How.	17738	6000		
Four 8 „ „	24675	8000		
Two 10 „ Mortars.	4000	6000		
Six 8 „ „	7688	12000		
Six 5½ „ „	4725	4500		
For Fuzes Quick Match &c.	10	600	600	
TRAIN No. 3.				Musketry lbs. 32400 or Barrels 324 Ordnance lbs. 82700 or Barrels 827 Mealed lbs. 600 or Barrels 10 lbs. Total Weight 115700
Four 24 Pounders	450	35200		
Four 18 „	425	26400		
One 10 inch Howitzer	8869	3000		
Two 8 „ „	12337	4000		
One 10 „ Mortar	2000	3000		
Four 8 „ „	5125	8000		
Four 5½ „ „	3150	3000		
For Fuzes, Quick Match &c.	0	100	600	

ANTIMONY.

Is used in Carcasses and Light Balls, and is required in the following quantity.

Nature of Train.	For what required.	Quantity allowed. lbs.	Total Quantity. lbs.
Train No. 1.	For 250—8 inch, and 500 5½ inch Carcasses. For 150—5½ inch Light Balls	84 47	131
Train No. 2.	For 150—8 inch, and 300 5½ inch Carcasses. For 75 Light Balls.	51 24	75
Train No. 3.	For 100—8 inch, and 200 5½ inch Carcasses. For 50 Light Balls.	34 16	50

BAGS CARTRIDGE SERGE EMPTY.

Are used to hold the charges of Powder, they are sometimes carried partly made up, and partly in bulk.—The following Tables will shew the quantity and weight of Serge required for a full complement of cartridge bags, and the number of yards that will make one hundred of each.

A proportion of Serge for the quantity of bags carried ready made up, must therefore be deducted from the number of pieces of Serge here laid down.

One bag is allowed for every round, and one-eighth spare.

Table No. 1.

Shews the dimensions of a bag of each description, the number of yards of Serge required for one hundred of each kind, together with the quantity of silk for sewing, and the weight of one hundred.—Also the quantity of twine for tying one hundred.

Description of Bag.	Dimensions. Length.	Dimensions. Breadth.	Quantity of Serge one yard wide required for 100.	Quantity of Silk for sewing 100.		Weight of 100 untied.		Quantity of Twine required for tying 100.	
	ins.	ins.	yards.	ozs.	drs.	lbs.	ozs.	ozs.	drs.
FIXED AMMUNITION.									
24 Pounder ⅓ shots weight.... ...	22	18½	37	3	0	16	4	10	0
18 ,, ⅓ ,, ,, ...	20½	16½	30	2	9	13	12	8	10
LOOSE AMMUNITION.									
24 Pounder charge ⅓ shots weight.	16	18½	28	2	2	11	7	4	2
24 ,, ,, ⅙ ,, ,,	12	18½	19	1	12	7	14	4	2
18 ,, ,, ⅓ ,, ,,	15	16½	25	1	14	9	8	3	12
18 ,, ,, ⅙ ,, ,,	11	16½	16	1	8	6	10	3	12
10 Inch Howitzer 8 lbs..	14	31½	38	2	14	17	1	6	0
8 ,, ,, 5 lbs....	13	25	23	2	6	10	14	5	8
10 ,, Mortar 2 lbs.............	10	17½	14	1	9	6	3	3	14
8 ,, ,, 1¼ lbs............	8	17½	11⅓	1	7	4	11	3	14
5½ ,, ,, ¾ lbs...........	7½	13	8½	1	4	3	14	3	4

The size of bags for Howitzers and Mortars, has been taken at what is considered an average charge, which it is presumed in the gross, will give a proper quantity of material.

Table No. 2.

Shews the quantity and weight of Serge required for a full complement of bags for each Train.

Nature of Train.	DESCRIPTION OF BAGS.	No. of bags allowed reckoning one for each round and ⅛ spare.	No. of pieces required of 63 yards long and one wide.	Total Number of pieces and weight of serge with package, taking each piece at 32 lbs.
		No.	pieces	
Train No. 1	Twelve 24 Pounders 1000 rounds ea charge ⅓	13500	79·18	Number of pieces 269 Weight lbs. 8606.
	" " " 200 " " ⅙	2700	8·21	
	Twelve 18 " 1000 " " ⅓	13500	64·28	
	" " " 200 " " ⅙	2700	6·54	
	Four 10inch howitzers 1100 " 8 lbs	4950	29·54	
	Six 8 " " 1200 " 5 "	8100	29·57	
	Four 10 " Mortars 1000 " 2 "	4500	10·0	
	Ten 8 " " 1025 " 1¼ "	11531	20·73	
	Ten 5½ " " 1050 " ¾ "	11813	15·93	
Train No. 2.	Six 24 Pounders 1000 rounds ea charge ⅓.....	6750	39·41	Number of pieces 144 Weight lbs. 4608.
	" " " 200 " " ⅙....	1350	4·11	
	Six 18 " 1000 " " ⅛.. ..	6750	32·14	
	" " " 200 " " ⅙....	1350	3·27	
	Two 10 inch Howz. 1100 " " 8lbs.	2475	14·59	
	Four 8 " " 1200 " " 5....	5400	19·71	
	Two 10 " Mortars 1000 " " 2....	2250	5·0	
	Six 8 " " 1025 " " 1¼.. ..	6919	12·44	
	Six 5½ " " 1050 " " ¾.. ..	7080	9·57	
Train No. 3.	Four 24 Pounders 1000 rounds ea charge ⅓.. ..	4500	26·27	Number of pieces 89 Weight lbs. 2848.
	" " " 200 " " ⅙.....	900	2·49	
	Four 18 " 1000 " " ⅓.....	4500	21·42	
	" " " 200 " " ⅙.....	900	2·9	
	One 10 inch Howzs. 1100 " " 8lbs	1238	7·29	
	Two 8 " " 1200 " " 5 "	2700	9·86	
	One 10 " Mortar 1000 " " 2 "	1125	2·32	
	Four 8 " " 1025 " " 1¼ "	4613	8·28	
	Four 5½ " " 1050 " " ¾ "	4725	6·37	

The above is calculated for fixed Ammunition for round shot.

When loose Ammunition is used, a smaller quantity of Serge will of course suffice, See Table No. 1.

BARRELS.

Budge, and 100*lbs. and* 60*lbs. Powder:*

NATURE.	Dimensions and Weight.								
	Length of leather Bag from mouth of Barrel.	Exterior length of each Barrel.	Interior length between the top and bottom hoops.	Exterior diameter at top and bottom.	Interior diameter at top and bottom.	Exterior diameter at broadest part or bulge.	Interior diameter at broadest part or bulge.	Diameter of the bung hole.	Weight.
	ins.	ins.	ins.	ins	ins.	ins.	ins.	ins.	lbs.
Budge..................	17	17	0	0	0	14	0	0	19¼
100lbs..................	0	21¼	17½	15½	14	17	15½	4	33
60lbs....................	0	18	14½	13	11¾	14¼	13	3½	22

NATURE OF TRAIN.	No. allowed for each Train.			Total Weight.
	Budge.	100lbs.	60lbs.	
No. 1 Train...............	34	3535	57	118564
No. 2 „	18	1897	39	63804
No. 3 „	11	1151	29	38833

The foregoing includes the number of barrels that will be required for a full complement of Powder, as it is difficult to say what quantity may be taken made up into cartridges, and a reduction therefore in the number of barrels should be made accordingly.

The budge barrel is used in Batteries to hold cartridges required for immediate service, and in Laboratories for any inflammable matter.

On the line of march, cartridge bags, and such like articles may be packed in them.

They are made in Magazines, have four copper hoops, and a leather bag which is drawn over the outside of the barrel, and fastened under the second hoop, extending about 17 inches beyond the mouth of the barrel, which serves to secure the Ammunition from accidental sparks of fire.

One is allowed for every gun and howitzer equipped for service.

Powder barrels, are made up at the Gun Carriage Agencies, or at the powder works, of either Teak or Goomar wood, and are constructed to hold either 100 or 60lbs. of powder each. The staves are ¾ of an inch in thickness, and are fastened together by 4 copper hoops, two at the ends, and two towards the centre. The hoops are an inch and a quarter broad, and one-tenth thick; those for the ends being 53 inches long, and weighing about 2 lbs. 3½ ozs. each —those for the centre 56 inches long, and weight about 2 lbs. 4 ozs. each.

Powder exposed to long land carriage, or liable to be much shaken should be lodged in gudgie, serge or flannel bags placed inside of each barrel, and tied tight so as to confine the motion of the powder as much as possible;—these bags to be invariably removed when the barrels are lodged in Magazines. The 100lbs. barrel is used for Ordnance and Musketry, and the 60lbs. for Mealed powder, Saltpetre, Sulphur, Resin &c.

BENCH FUZE.

With Knife complete.

DIMENSIONS OF BENCH.			
Length.	Breadth.	Height of Bench from ground.	Weight.
ins.	ins.	ins.	lbs.
30	9	30	65

Nature of Train.	No. allowed.	Total Weight.
		lbs.
Train No. 1.	17	1105
Train No. 2.	9	585
Train No. 3.	6	390

Are made up in Magazines,—the number inserted, as allowed, is calculated as follows.

One for every 4 Guns.

One for every two 10 inch Mortars or Howitzers.

One for every four 8 inch, or 5½ inch Mortars and Howitzers equipped for Service.

BLOCKS FUZE DRIVING.

Dimensions.		
Length.	Largest Diameter.	Weight.
inches.	inches.	lbs.
26	14	122

Nature of Train.	Number allowed.	Total weight.
		lbs.
Train No. 1.	17	2074
Train No. 2.	10	1220
Train No. 3.	6	732

Are made in Magazines,—one is allowed for every two Mortars and Howitzers equipped for Service.

They are used for holding Fuzes, while the composition is driven into them.—Two copper bands or hoops are attached to each end.

BLOCKS FUZE SETTING.

Dimensions.			
Length.	Breadth.	Thickness.	Weight.
inches.	inches	inches.	lbs.
72	18	6	250

Nature of Train.	Number allowed.	Total weight.
		lbs.
Train No. 1.	17	4250
Train No. 2.	10	2500
Train No. 3.	6	1500

These are solid blocks of wood hollowed out sufficiently to receive the bottom of Shells, while the Fuze is being set.—They are made up in Magazines.

One is allowed for every two Mortars, or Howitzers, equipped for Service.

BOILERS COPPER.

And cast iron tripod.

		Dimensions.		
		Diameter.	Depth.	Weight.
		ins.	ins.	lbs.
Boilers Copper.	1st size.	24	18	80
	2d size.	22	16	64
	3d size.	20	14	518
Boilers cast Iron tripod.	1st size.	25	18	231
	2d size.	20	14	97
	3d size.	14½	10	56

Nature of Train.	Number allowed.		Total weight.
	Copper.	Iron.	lbs.
Train No. 1.	3	3	1739
Train No. 2.	2	2	1159
Train No. 3.	1	1	580

COPPER BOILERS.

Are sent from England in sets or nests.

There are three in a set of sizes, as in Table.

They are used for purifying saltpetre, melting wax, for wax paulins, and mixing tar and grease.

THE CAST IRON BOILERS.

Are also sent from England, and are of various sizes as in Table.—They are used in mixing hot compositions such as carcasses, light balls, smoke balls &c.—The most convenient size for these purposes, is that of 20 by 14 inches.—The smallest ones or third size are used for making kit, heating composition for shot bottoms &c.

BORAX.

Is used in melting hammered brass for soldering. Half a pound is allowed for each piece of Ordnance viz.

Nature of Train.	Weight.
	lbs.
Train No. 1	26
Train No. 2	16
Train No. 3	8

BOXES PACKING.

NATURE.	Dimensions.			Number of rounds.	Weight empty.	Weight filled.	REMARKS.
	Length.	Breadth.	Depth.				
	ins.	ins.	ins.	No.	lbs.	lbs.	
8 inch Shrapnell... ..	17	17	9	4	32	272	The weight will of course vary a little according to the wood used.
24 Pdr. „	18½	12	7	6	31	146	
18 „ „	17	11	6½	6	20	109	
5½ inch light ball.. ...	31	12	6¼	10	40	98	
Signal rockets	27	16½	9¼	50	29	88	
FUZE BOXES.							
10 inch common	30	15	11	200	48	120	
8 „ „	26	15	11	200	43	98	
5½ „ „	26	15	11	400	43	97	
1st Size Shrapnell ..	22½	16	9	720	37	76	
2d „ „	17	12½	7	720	20	44	

NATURE OF TRAIN.	No. of Boxes for each Train.						Total weight empty for each train.
	Shrapnell.			5½ in light balls.	Signal rockets.	Fuzes.	
	8 inch.	24 Pounder.	18 Pounder.				
							lbs.
Train No. 1	150	200	200	15	3	95	19794
Train No. 2..	100	100	100	8	2	57	11137
Train No. 3.	50	67	67	5	1	32	6643

Packing boxes are made up in Magazines of Mango or any other woods available. They are used for packing shrapnell shells, light balls, signal rockets, and fuzes.

The above are convenient sizes; the number of rounds in each Box, varying according to the nature of the Ammunition &c. They should all be provided with two rope handles, to lift them, and be divided by wooden partitions, so as to keep each round separate, excepting the Rocket, and Fuze Boxes, which are made flush.

BRASS.

Cast and Hammered.

Cast brass is used for the repair of hinges, brass nave, boxes &c. and Hammered brass is used for soldering—One pound of each is allowed for each piece of Ordnance equipped for Service viz.

Nature of Train.	Brass.		Total for each Train.
	Cast	Hammered.	
	lbs.	lbs.	lbs.
Train No. 1 ..	58	58	116
Train No. 2 ..	32	32	64
Train No. 3 ...	20	20	40

BRUSHES.

Hand and Mealing.

Are sent from Europe.—The hand brushes are used at the mealing table, to collect the mealed powder &c., the back including the handle is about 16 inches long, and each weighs about 7 ounces. The mealing brushes are made in a semicircular form, having the back about 1½ inch broad, and weigh about 6 ounces each.

One of the former, and two of the latter are allowed to each Mortar and Howitzer.

Nature of Train.	No. allowed.		Total Weight for each Train.
	Hand.	Mealing.	
			lbs.
Train No. 1.........	30	60	36
Train No. 2.........	20	40	24
Train No. 3.........	12	24	14

BUNTIN.

Is sent from Europe of various colors, and is used for making and mending flags, and capping tubes;—it is in pieces of 43 yards long, and 18 inches wide—each piece weighing about 4½ lbs.

Naure of Train.	Quantity allowed.	Total Weight of each Train.
		lbs.
Train No. 1........	3 pieces or 129 yards.	13½
Train No. 2.........	2 pieces or 86 yards.	9
Train No. 3.........	1 piece or 43 yards.	4½

CANDLES WAX.

Are received into Magazines from the Commissariat. Two lbs. are allowed for each piece of Ordnance.

Nature of Train.	Total Weight for each Train.
	lbs.
Train No. 1.........	116
Train No. 2.........	64
Train No. 3.........	40

CLOTH DOOSOOTIE.

	Yards.	Weight lbs.
Train No. 1......	200	93
Train No 2......	150	70
Train No. 3......	100	46½

CLOTHS POWDER.

Are made in Magazines, and are used for spreading Gunpowder on, and in Laboratory Tents. They are made of vitry Canvass, the following is a convenient size, and will require materials as stated.

Dimensions.		Number of yards of vitry 36 inches wide required for each.	Quantity of twine country or Europe required for each.	Weight.
Length.	Breadth.			
feet.	feet.	yards.	ozs.	lbs.
18	11½	24	8	23

Nature of Train.	No. allowed for each.	Total weight for each train.
		lbs.
Train No. 1	16	368
Train No. 2	10	230
Train No 3	5	115

FLOUR.

Is received from the Commissariat, and is used for paste in making Portfire and Rocket Cases, also moulds for Light Balls, &c. &c. it is allowed as follows.

Nature of Train.	Quantity allowed
	lbs.
Train No. 1	80
Train No. 2	40
Train No. 3	20

FORMERS CARTRIDGE.

Are made up in Magazines—they are used to guide the person cutting serge for cartridge bags.—One is allowed for every Gun, Howitzer, or Mortar equipped for Service.

Nature.	Dimensions.			Weight.		
	Length.	Breadth.	Thickness.			
	ins.	ins.	ins.	lbs.	ozs.	drs.
24 Pounder	21	8·3	0·6	2	1	0
18 "	19·7	7·55	0·6	1	14	0
10 inch Howitzer	14	14.5	0·75	2	14	8
8 " "	13	11	0·75	1	12	0
10 " Mortar........	9·5	9	0·6	1	2	0
8 " "	8	8·5	0·6	0	14	0
5½ " "	7	6	0·6	0	9	2

Nature of Train.	Number allowed of.							Total weight for each Train.
	24 Pounder.	18 Pounder.	10 inch Howitzer.	8 inch Howitzer.	10 inch Mortar.	8 inch Mortar.	5½ inch Mortar.	
								lbs.
Train No. 1. ...	12	12	4	6	4	10	10	89
Train No 2. ...	6	6	2	4	2	6	6	48
Train No. 3. ...	4	4	1	2	1	4	4	29

FUZES EMPTY.

The best are made from Beech wood sent from Europe which is cut up for this purpose in Magazines, and supplied in planks of different thicknesses from the Arsenal.—One Fuze is allowed for every Shell, and one-fifth spare.

With a Siege Train, Fuzes are to be filled as required. They are turned in Magazines so as nearly to fill the Fuze holes, but ought not to be graduated till filled.

As the Fuze holes, of our Shells however vary much in size care should be taken not to turn them too low.

They are packed in boxes.

Nature.		Weight of 100 turned.	Number in a Box.	Weight of Box filled.
		lbs.		lbs.
10 inch common		34	200	120
8 " "		27½	200	98
5½ " "		13½	400	97
Shrap.	1st size	5½	720	76
	2d size	3½	720	44

Nature of Train.	No. of Boxes.					Total wght. including boxes for each Train.
	10 in. common.	8 in. common.	5½ in. common.	Shrap. 1st size.	Shrap. 2d size.	
						lbs.
Train No. 1...	24	36	30	1	4	9570
Train No. 2...	12	24	18	1	2	5702
Train No. 3...	6	12	12	1	2	3224

The bore of all Fuzes is now to be made the same diameter, and the calculations for Sulphur, and Saltpetre &c. (see under these heads) have been made for Fuzes having a bore of 3-tenths diameter.

GLUE.

Used in fixing cylinders for Rocket heads, in repairing wood work, and sometimes for fixing Shot or Shells to wooden bottoms. One lb. is allowed to every piece of Ordnance equipped for Service.

Nature of Train.	Total weight for each.
	lbs.
Train No. 1..........................	58
Train No. 2..........................	32
Train No. 3..........................	20

GREASE.

Is used in carcass and other compositions, for quantity required, see under that head ;—it is also used for greasing wheels, for which purpose every Carriage is provided with a keg filled, and containing about 10lbs. see under head "Kegs for Grease."

GUNNIES DOUBLE.

Is used for making bags to hold Cartridge Bags, also for slings to carry heavy Shot or Shells, as well as Powder Barrels.

Two pieces will make a bag large enough to hold about 1500-24 or 18 pounder Cartridge Bags, for fixed Ammunition. Five pieces are allowed for each Gun, Howitzer or Mortar.

Dimensions.		Weight of each piece.
Length.	Breadth.	
yards.	inches.	lbs.
11	9	4½

Nature of Train.	Number of pieces allowed.	Total Weight.
		lbs.
Train No. 1.......	290	1305
Train No. 2.......	160	720
Train No. 3.......	100	450

INSTRUMENTS GUNNERS.

Are required for proving and preparing Shells, and laying Ordnance &c., and are made up into sets of different sizes. Full sets are issued for the use of the Train generally, and are set apart for the Laboratory, the small sets are proportioned to the number of pieces of different denominations, composing the Trains and are sent with the Ordnance for service in the Batteries.

Four full sets are allowed for Train No. 1.
Two " " " Train No. 2.
One " " " Train No. 3.

The small sets are given in the following proportion.
One set for every four Guns.
One set for every two 10 inch Mortars, or Howitzers.
One set for every four 8 or 5½ inch Mortars or Howitzers.

No.	FULL SET.	No.	SMALL SET.
2	Augers Fuze, with Brace	2	Augers Fuze, with Brace
2	Augers hand	2	Augers hand
1	Bellows pairs, for prov-	1	Compasses spring
	ing Shells	2	Files saw
1	Calliper, gun large pair	2	Funnels tin
1	,, small ,,	2	Graduators Fuze
1	,, shell, 4 in a set	2	Mallets driving } Large
	viz. 3 Calliper bow of		or setting } Small
	sizes, 1 Calliper bottom	1	Level spirit
	Compass spring.	2	Markers, Fuze
1	Engines Fuze, of sizes		Measures powder copper,
2	Files saw		6 in a set, containing
2	Funnels tin		8,6,5,4,3 & 1 lbs.
2	Graduators Fuze	1	Measure for spherical
2	Guages, ring, shot and		case, 7 in a set, sets
1	shell high setts	2	Pincers Fuze
	,, ,, ,, low ,,	1	Quadrant
1	Hammer for proving	2	Rasps Fuze
1	shells	2	Saws Fuze
	Instruments, Mathema-	1	Scale, Gunters Brass
1	tical cases	2	Sets saw
	Level spirit	2	Setters Fuze 10 inch
1	Markers Fuze	2	,, ,, 8 ,,
2	Mallets setting, or driv-	2	,, ,, 5½ ,,
6	ing large		3 in { One 10 in. }
	Mallets setting small		a set { One 8 in. } sets
6	Mirror with case		viz. { One 5½ in. }
1	Measures powder copper,	1	Telescope
	6 in a set, containing	1	Vice, Block, or Bench
	8,6,5,4,3 and 1 ℔.		Fuze
	Measure, for spherical	1	Vice, Hand, Fuze
1	case, 7 in a set, sets	1	Scales copper small
	Pincers, Fuze		(with brass weights),
2	Quadrant		from 7 lbs. to 1
1	Rasps Fuze		drachm.
2	Saws Fuze		
2	Scraper Shell		
1			

No.	FULL SET, (continued).
1	Scales, Gunters Brass
2	Sets, Saw
2	Setters, Fuze 10 inch
2	" " 8 "
2	" " 5½ "
1	Telescope
1	Vice, Block or Bench, Fuze
1	Vice, Hand Fuze
1	Vice, Cooper's
8	Drifts, sets, 4 in a set $\frac{3}{16}$ diameter
8	Ladles
8	Composition pans
20	Strips of leather
1	Scales Copper small with brass weights from 7 lbs. to 1 drachm.

Nature of Train.	Number of sets to each Train.		Total weight with each train.
	Full.	Small.	lbs.
Train No. 1	4	16	1582
Train No. 2	2	9	849
Train No. 3	1	5	454

KIT.

For the mode of preparing, see "Laboratory course," it is used round the Fuze when set, to stop up any cavities that may remain between the Fuze, and Fuze hole, to prevent flame communicating to the bursting powder, when the piece is discharged, and for capping Carcasses.

Three pounds are allowed for each Howitzer and Mortar.

Nature of Train.	Total weight with each Train.
	lbs.
Train No. 1.	102
Train No. 2.	60
Train No. 3.	36

KNIVES LABORATORY.

Used for cutting paper, twine, or rope &c. &c. they are similar to those used with Field Batteries.

One is allowed for each piece of Ordnance.

Blade.		Handle.			
Length.	Breadth.	Length.	Diameter at small end.	Diameter at thick end.	Weight of each.
ins.	ins.	ins.	ins.	ins.	ozs.
6	1⅛	4½	⅞	1⅛	3

Nature of Train.	Number allowed for each Train.	Total Weight.	
		lbs.	ozs.
Train No. 1...	58	10	14
Train No. 2...	32	6	0
Train No. 3...	20	3	12

LANTERNS.

Are used at night in the Batteries, in the Park, and on the line of march.

There are three kinds in Train Equipments, of dimensions and weight as follows.

Nature.	Length.	Diameter.	Weight.			
	ins.	ins.	lbs.	ozs.	drs.	
Dark......	10	3½	0	14	0	used in Batteries.
Horn......	15	6	0	14	0	,, in Parks.
Muscovy.	20	9	2	8	0	,, on line of March.

Nature of Train.	No. of each allowed.	Total Weight.
	No.	lbs.
Train No.1.	12	51
Train No.2.	8	34
Train No.3.	4	17

LEAD.

Used in preparing Solder for brass.

20lbs. are allowed for Train No. 1.
15 ,, ,, ,, ,, ,, No. 2.
10 ,, ,, ,, ,, ,, No. 3.

LIGHT BALLS.

Are used to throw into the Enemy's work at night, when work is supposed to be going on.

They are allowed in the following proportions.

Nature of Train.	Number allowed.	Weight.	
		of each.	Total
		lbs.	lbs.
Train No. 1...	150	6	900
Train No. 2...	75	6	450
Train No. 3...	50	6	300

And the following materials will make up the above quantity. It is better however to carry them with the Train ready made, and to prime them about the time they are required for use.

	For making Balls.									For Priming.									Moulds for Casting.		
Train Number.	Antimony.		Saltpetre.			Sulphur.		Pitch.		Saltpetre.		Sulphur.		Mealed Powder.		Quick Match.		Spirits of Wine.	Paper Europe Port-fire	Flour for Paste.	
	lbs.	ozs.	lbs.	ozs.	drs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	Pints	Sheets.	lbs.	ozs.
1	46	14	625	0	0	234	6	46	14	10	14	6	12	13	2	9	6	$1\frac{1}{8}$	900	10	14
2	23	7	312	8	0	117	3	23	7	5	7	3	6	6	9	4	11	$\frac{9}{16}$	450	5	7
3	15	10	208	5	4	78	2	15	10	3	10	2	4	4	6	3	2	$\frac{6}{16}$	300	3	10

LINE LOG.

Used for lashings to Gun Aprons, Spunge Caps, and Muzzle Caps &c.

It is sent from Europe in skeins that average about 70 yards in length, and in weight 1℔ 6ozs.—It is allowed at the rate of 2 skeins for each piece of Ordnance, exclusive of what is required for quilting grape.

	No. of Skeins allowed.	Total weight. lbs.
Train No. 1.	116	159
Train No. 2.	64	88
Train No. 3.	40	55

MATCH GUN OR SLOW.

Is merely Country Cotton rope, served out by the Commissariat to Magazines on Indent.—It is then made up into skeins of 6 yards each.—One Skein will burn about 36 hours.

When old rope is served out, it should be untwisted, and then made up again, as the strands become too closely drawn to allow of its burning properly.

It is allowed at the rate of six skeins for every Gun, and three for every Howitzer and Mortar equipped for Service.

The skeins are the same size as those with Field Batteries.

Dimensions of each Skein.				
Total length.	Length when rolled up.	Diameter when rolled up.	Total weight.
ins.	ins.	ins.	lbs.
216	9½	2½	½

Nature of Train.	No. of Skeins allowed for each Train.	Total weight. lbs.
Train No. 1.	246	123
Train No. 2.	132	66
Train No. 3.	84	42

MATCH QUICK.

For the mode of preparing see " Laboratory course." It is used for priming Fuzes, Carcasses, and Light Balls, also for firing Mortars (when Tubes are not employed) and for Rockets.

Nature of Train.	Number of yards required.	Weight at 104 yards per lb.
	yards.	lbs.
Train No. 1.	31200	300
Train No. 2.	19200	185
Train No. 3.	11200	108

When Quick Match is not carried ready made up, see Table under head " Thread" for the quantity of Cotton required.—To every 13½℔s of Quick Match, there is about one pound, and twelve Ounces of Cotton.

Quantity of Ingredients required for the above.

	Saltpetre.	Mealed Powder.	Spirits of Wine.	Thread Cotton.
	lbs.	lbs.	Quarts	lbs.
Train No. 1 lbs. 301.	35	225	45	39
Train No. 2 lbs. 185.	21	140	28	24
Train No. 3 lbs. 108.	12	80	16	14

MEASURES POWDER COPPER.

Are made up in sets.

A set for Ordnance Powder consists of 6 measures, the largest holding 10℔s 10ozs. 10drs.—the smallest ℔ 1.

In a set of Spherical case Powder measures, there are seven, the largest holding 7 ozs. and the smallest 1½ ozs. of powder.

The several measures of each set, fit one within the other,

They are allowed at the rate of 16 sets for train No. 1—9 sets for train No. 2,—and 5 sets for train No. 3, or one set to each set of Instruments,—see under head " Instruments."

MIRRORS.

Are sent from Europe, and are used for reflecting the sun's rays into the bore of a piece of Ordnance when under examination, by which means flaws may be observed. They are generally set in brass, and weigh about one pound, see under head "Instruments."

MIXERS COPPER.

Dimensions.				
Length.	Breadth of Under side.	Breadth of Upper side.	Distance between the sides.	Weight of each.
ins.	ins.	ins.	ins.	lbs.
13	4½	3	2	2

Number allowed for each train.		
Nature of Train.	No.	Total weight.
		lbs.
Train No. 1.........	12	24
Train No. 2	8	16
Train No. 3...	4	8

Are made of thick sheet copper cut about 13 inches by 8 inches, which is then doubled over, so that the under side extends about an inch and a half beyond the upper.

They are used at the mealing table, and in preparing dry compositions.

They are allowed at the rate of 2 to each mealing and laboratory table with the train.

NEEDLES.

Nature.	Length.	Weight of one hundred.		
	ins.	lbs.	ozs.	drs.
Sewing....	1·8	0	1	2
Sail 1st size	3·3	0	4	4
Sail 2d size	2·2	0	12	8
Packing.....	4·8	1	4	2

Number allowed for the train.	Sewing	Sail. 1st Size.	Sail. 2d Size.	Packing.	Total weight.
					lbs.
No. 1 Train	1160	290	290	290	7½
No. 2 Train	640	160	160	160	4⅛
No. 3 Train	400	100	100	100	2⅝

They are used for the following purposes viz.

Needles sewing.—In making cartridge bags, making and repairing flags.

Needles sail.—In making and repairing powder cloths, pawlins, and other articles made of vitry, canvass, or double gunny.

Needles packing.—In sewing single gunny, and in covering boxes, and other packages.

The number allowed for each piece of Ordnance composing the train is as follows.

Sewing		20
Sail	1st size	5
	2d size	5
Packing		5

OIL.

Cocoanut and Mustard.

Quantity allowed for the Train.	Nature and weight	
	Cocoanut	Mustard.
	lbs.	lbs.
No. 1 Train	58	187½
No. 2 Train	32	112½
No. 3 Train	20	75

Cocoanut Oil, is used by Sicklegars in cleaning elevating screws and other articles.

Mustard Oil, is used for cleaning the hands, after working Carcass composition.

The following quantity is allowed.—Cocoanut 1lb. for each piece of Ordnance.—Mustard 5lbs for every 20 carcasses.

PADDLES PULVERISING.

Handle		Paddle		Total Length.	Weight.	
Length.	Diameter.	Length.	Breadth.			
ins.	ins.	ins.	ins.	ins.	lbs.	ozs.
52	1½	8	5	60	5	4

Nature of Train.		Total weight.	
	No.		
		lbs.	ozs.
No. 1 Train	18	94	8
No. 2 Train	12	63	0
No. 3 Train	6	31	8

They are used in the preparation of different ingredients where fire is employed, and also in mixing hot compositions. The paddle should be tipped with copper, about 5 inches up.

They are allowed in the proportion of one to every boiler.

PAINT PREPARED CARRIAGE.

Carriage or Bed.	Quantity for each Carriage and Mortar.	34 Carriages. Train No. 1.	18 Carriages. Train No. 2.	11 Carriages. Train No. 3.
	lbs.	lbs.	lbs.	lbs.
Siege Carriage, Gun, or Howitzer with yokes, handspikes, box &c. &c.	20	680	360	220
10 inch Mortar.	1½	6	3	1½
8 „ „	1	10	6	4
5½ „ „	1¼	12½	7½	5
Total for each Train.... .. .		708½	376½	230½

Paint absorbs oil, consequently when long mixed it becomes too thick for use. Oil should be sent in jars to mix with it when required, at the rate of ¼ of a pint to each lb. of paint allowed, which will give,

For Train	No. 1,	Oil Linseed	Gallons	22	2	0
„ „	No. 2,	„ „	„	11	3	1
„ „	No. 3,	„ „	„	7	0	2

Country Linseed Oil will not dry without the assistance of Spirits of Turpentine.—1 pint will be required for every 20 lbs. of prepared paint, which will give,

For Train	No. 1,	Gallons	4	1	1
„	No. 2.	„	2	2	0
„	No. 3.	„	1	1	1

Brushes paint are allowed at the rate of one for every two carriages, which will be,

For Train	No. 1	17
„	No. 2	9
„	No. 3	6

PALMS STEEL.

Number allowed for each Train.		
Nature of Train.	No.	Total Weight.
		lbs.
No. 1 Train......	58	4½
No. 2 Train.......	32	2¼
No. 3 Train	20	1¼

They are used in making spunge heads, and in sewing Canvass, or other hard material, where much force is required in using the needle.

They are allowed in the proportion of one to each piece of Ordnance.

PANS COPPER.

Composition and Drying.

Nature of Pan.	Dimensions.						
	Composition.				Cooling.		
			Handle				
	Diameter.	Depth.	Height of uprights.	Length of cross piece.	Length.	Breadth.	Weight of each.
	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Composition.	7	2¼	2¼	7	0	0	1
Drying.........	0	0	0	0	48	24	26

No. allowed for each Train.			
Nature of Train.	Composition.	Cooling.	Total weight.
			lbs.
No. 1. Train	17	17	459
No. 2. Train	10	10	270
No. 3. Train	6	6	161

Composition Pans are used to hold composition when driving Fuzes, Portfires, or Rockets ; they should all have handles above the pan, which besides being useful in removing the pans, are required to pass the ladle under when filled with composition to ensure each ladleful being equal in quantity. The handles are merely strips of Copper joined to the pan by upright pieces of the same material.

The pan is somewhat in shape like a large saucer.

They are allowed in the proportion of one to every 2 Mortars and Howitzers.

Drying Pans, are made of sheet copper, a sheet being used for each pan, the edges of which are turned up about 2 inches, to form sides.

They are used in drying different ingredients, and to receive hot compositions to cool.

They are allowed in the proportion of one to every 2 Howitzers and Mortars.

PAPER.

Foolscap and Portfire Europe; and Portfire and Cartridge Country.

Nature.	Dimensions of each sheet.		Weight of a quire.		Nature of Train.	Quantity allowed for each Train.				Total weight for each Train.
	Length.	Breadth.				Foolscap Europe.	Portfire Europe.	Portfire Country.	Cartridge Country.	
	ins.	ins.	lbs.	ozs.		Quires.	Quires.	Quires.	Quires.	lbs.
Foolscap Europe.	16	12⅛	0	13¼	Train No. 1.	58	58	58	222	392
Portfire do.	26	21	3	0	Train No. 2.	32	32	32	130	220
do. Country.	21	16	1	0	Train No. 3.	20	20	20	78	136
Cartridge do.	20	14	0	8						

Foolscap paper is used for fair copies of Reports &c. A quire is allowed for every piece of Ordnance.

Europe Portfire paper is used for the Portfire and Rocket cases, also at the Mealing Table, and for rough Reports and Returns from the Park and Batteries.

A quire for each piece of Ordnance is given for the latter purposes but none in the foregoing Tables for Portfire and

Rocket cases, as these articles will generally be carried ready made up ; when otherwise the quantities mentioned below will be required and must be added.

Country Portfire paper is also used in Portfire cases (which are composed of partly Europe, and partly Couutry paper) and also for light ball moulds ; for packing different articles, and for rough work in the Park. A quire for the latter purposes is allowed for each piece of Ordnance, for the former when not served out ready made, as follows, viz.

For Portfire Cases 58 Sheets Europe—and 150 Sheets Country........................	per 100
For 1. Pdr. Rocket Cases 430 Europe	per 100
For 5½ Light Ball Moulds 1000 Sheets.......	per 100

Country Cartridge paper, is used for bundling and capping Fuzes, at the rate of 6 sheets for capping, and 6 sheets for bundling 100 Fuzes.

Train No. 1 has 44400 Fuzes, and would therefore require............222 quires.
„ No. 2 has 25920 „ ...130 „
„ No. 3 has 15600 „ .... 78 „

When Fuzes are served out ready capped and bundled this of course will not be required

PAULINS WAXED.

Magazine large, Magazine small, and Camel.

Nature and Dimensions.	Length.	Breadth.	Weight of each.
	ft.	ft.	lbs.
Magazine Large.	24	16	115
Do. small.........	18	12	67
Camel....	7	5	12

Nature of Train.	No. allowed for each Train.			Total weight.
	Magazine large	Magazine small	Camel.	
				lbs.
No. 1 Train	30	30	30	5820
No. 2 Train	20	20	20	3880
No. 3 Train	10	10	10	1940

Magazine large Paulins are used on the floors of Laboratory tents.

Magazine small Paulins are used for covering powder barrels, and live shells in the Batteries.

Camel Paulins being of a small size are frequently very convenient, and are used for the same purposes, as Paulins waxed small.

Thirty of each kind are allowed for No. 1.—Twenty for No. 2. and ten for No. 3 train.

No allowance has been made for Paulins required to cover stores on hackeries or carts, these must be supplied as required.

PENCILS BLACK LEAD.

Length.	Diameter	Weight.
ins.	ins.	drs.
6½	0·3	2

Nature of Train.	No. allowed for each Train.	Total weight.	
		ozs.	drs.
Train No. 1	58	7	4
Train No. 2	32	4	0
Train No. 3	20	2	8

Are allowed in the proportion of one to every piece of Ordnance, and are used in the Park and Batteries.

PENDULUMS.

Gunner's and common with Gallows.

Nature of Pendulum.	Dimensions and Weight.	
	Height of Stand.	Weight of each.
	feet.	lbs.
Gunner's...	7	14
Common....	6	48

Nature of Train.	No. of either description of Pendulum allowed.			
	Gunners.		Common.	
	No.	Total weight.	No.	Total weight
	"	lbs.	"	lbs.
Train No. 1..	6	84	6	288
Train No. 2...	4	56	4	192
Train No. 3...	2	28	2	96

The common Pendulum is the one in general use at present in this service, it is merely a string attached to a leaden ball, and suspended from the centre of a wooden stand, termed a gallows; this however is very liable to be broken in travelling, and weighs much more than the Gunners' Pendulum.

Gunner's Pendulum are sent from England, and have a flat brass bar with a weight at one end, which is regulated as to length by a screw at the bottom. The Pendulum arm is attached to the stand by a steel spring in which is the point of oscillation. The stand is three straight legs, made to close after the fashion of a theodolite stand, and is consequently much less liable to damage than the common stand.

PESTLES AND MORTARS BRASS.

Large and Small.

Nature.	Dimensions & weight		
	Diamr.	Height	Weight
	ins.	ins.	lbs.
Large. ..	10	8	60
Small....	7	5	26

Nature of Train.	No. allowed for each Train.		Total weight.
	Large.	Small.	
			lbs.
No. 1 Train	6	6	516
No. 2 Train	4	4	344
No. 3 Train	2	2	172

These are used in Laboratories for pounding ingredients.

The above dimensions are given as a convenient size, but the shape, dimensions, and weight, vary considerably.

PINCERS LOADING.

Howitzer.

Nature.	Dimensions.		Weight.
	Total Length.	Length of Wooden Handle.	
	feet.	feet.	lbs.
10 inch Howr.	4½	3¾	9
8 " "	4	3¼	7¼

Nature of Train.	No. of each allowed for the Train.		Total weight.
	10 inch Howr.	8 inch Howr.	
			lbs.
No. 1 Train.	4	6	79½
No. 2 Train.	2	4	47
No. 3 Train.	1	2	23½

Are used for assisting in lifting shells without lugs, and setting them home in howitzers and small mortars, and also extracting fuzes.—They are of sizes as above.—The howitzer pincers have long handles, one of which is made of wood, and the other of iron.—This is however a very inconvenient mode of loading, and very apt to loosen the Fuze.—Great care must therefore be taken in putting the shell home.

Fuze pincers for mortars, are included amongst "Instruments Gunners."

PINCERS GUN.

	Total length.	Weight.
	ins.	lbs.
Pincers Gun.	15	2

Nature of Train.	Number allowed for each Train.	Total Weight.
		lbs.
No. 1 Train.	58	116
No. 2 Train.	32	64
No. 3 Train.	20	40

These are more particularly described in the "Field Battery tables," one is allowed for every piece of Ordnance.

PITCH.

Used in carcasses, light balls, and kit.

PORTFIRES.

Are the same as used with Field Batteries, weighing each about 5 ozs. 4 drs.

The quantity allowed for each train is calculated at the rate of one Portfire, to every ten rounds of ammunition.

Nature of Train.	Number allowed.	Total Weight.
		lbs.
Train No. 1.	6515	2138
Train No. 2.	3582	1175
Train No. 3.	2240	735

RUBBERS HAND, MEALING TABLE.

Are solid pieces of hard wood with two upright wooden handles.—Old Sissoo is the best wood.—They are made in Magazines, and are used to meal Powder, and other ingredients.—Two are allowed to each mealing Table—see "Tables."

Dimensions.				
Length.	Breadth.	Thickness.	Length of Handles.	Weight.
ins.	ins.	ins.	ins.	lbs.
14	6	4	6	12

Nature of Train.	Number allowed.	Total weight.
		lbs.
Train No. 1	6	72
Train No. 2	4	48
Train No. 3	2	24

ROCKETS.

Are used for signals, and are allowed for each Train as follows.

Nature of Train.	Number carried with each Train.	Weight of each.		Total weight for each Train.
		lbs.	ozs.	lbs.
Train No. 1.	150	1	3	178
Train No. 2.	100			118
Train No. 3.	50			55

The following Table shews the proportion of the several ingredients required to make 100—1 Pounder Rockets.

Composition for																						
Driving.										Stars.												
Saltpetre Pulverized.			Sulphur Refined.		Charcoal (expressly prepared.)			Total weight.		Saltpetre Pulverized.	Sulphur Refined.		Yellow or Red Orpiment.		Isinglass.	Vinegar, white wine.	Spirits of Wine.	Mealed Powder.		Total Weight.		
lbs.	ozs.	drs.	lbs.	ozs.	lbs.	ozs.	drs.	lbs.	ozs.	lbs.	lbs.	ozs.	lbs.	ozs.	ozs.	quarts.	quarts.	lbs.	ozs.	lbs.	ozs.	
26	6	8	4	14	9	5	8	40	10	11	5	8	1	6	14	1	1	14	10	33	8	

For Priming.					Paper.					
Quick Match.		Spirits of Wine.	Mealed Powder.		For Cases, Country Entally 1st class.		For Cylinders, Cones, and Star Cases, Country Entally 1st class.		Europe Portfire for Cones.	Country Musket Cartridge for slips in heading.
lbs.	ozs.	pints.	lbs.	ozs.	quires.	sheets.	quires.	sheets.	sheets.	sheets.
1	14	1¾	1	4	15	10	1	16	10	10

Twine Europe No. 1					Log Line Country.				Flour for making Cases, Cylinders, Cones, and pasting slips in heading.		Soap used in Soaping the Formers to prevent its blistering the case.		Glue for gluing Cylinders to the body.	
For tying Collars to Cylinders.		For making choking lines.			For tying chokes to cases.		For tying Rockets on shafts.							
ozs.	drs.	lbs.	ozs.	drs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.
1	9	2	1	0	1	9	5	10	8	12	2	8	3	2

Wood.			Ten Deal planks for Shafts each plank.			
Fire, for making Glue and Paste.	Teak for making Cylinder Collars.		Length.		Breadth.	Thickness.
lbs.	cubic feet.	cubic ins.	feet.	ins.	feet.	tenths.
140	3	4	8	2	1	8

RESIN.

Used in kit and carcasses—see " Kit"—and " Shells Carcass Field," which are taken ready prepared.

SAL AMMONIAC.

Is used with pewter in soldering, ½ lb. is allowed for every piece of Ordnance.

For Train No. 1......	29lbs.
For Train No. 2......	16lbs.
For Train No. 3......	10lbs.

SALTPETRE PULVERIZRD.

Used in every Composition.

Nature of Train.	Quantity allowed.
	lbs.
For Train No. 1........	1800
For Train No. 2........	1100
For Train No. 3.......	700

SCALES.

Wooden Large, with Beam and Triangle,

ALSO

Scales Copper, large, medium and small.

The large wooden Scales are used for heavy weights, and are suspended from a Triangle, the limbs being about 13 feet each in length, and if made of Saul wood the whole will weigh about 3 cwt. 2 qrs.

The Copper Scales are used in Laboratories, and in Batteries, for weighing powder, &c. one set of weights is attached to each pair of Scale as follows.

Table No. 1, shewing the number of weights of different kinds, sent with every pair of Scales allowed for Trains.

Nature of Scales.	Of lb. each.							Of oz. each.				Of drs. ca.				Total Weight of each set.				
	56	28	14	7	4	2	1	8	4	2	1	8	4	2	1	cwt.	qrs.	lbs.	ozs.	drs.
Scales large Wooden.....	20	1	1	1	1	1	1	1	1	1	1	0	0	0	0	10	2	0	15	0
„ Copper	0	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	2	0	15	0
„ Medium	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	0	1	0	15	15
„ Small...	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	0	0	14	15	15

Table No. 2, shewing the dimensions of different descriptions of Scales, and the Total weight of each pair, including a set of weights, as in Table No. 1.

	Dimensions.										Total weight of each including Scales, Beams, Weights and Triangles.				
			Scales.												
			Wooden.						Copper.						
	Length of Beam.		Length.		Breadth.		Thickness.		Diameter.	Depth.					
	feet.	ins.	feet.	ins.	feet.	ins.	feet.	ins.	ins.	ins.	cwt.	qrs.	lbs.	ozs.	drs.
Large Wooden ...	5	3	2	10	2	7	0	2	0	0	16	2	9	0	0
„ Copper......	2	4	0	0	0	0	0	0	14	6	0	2	20	9	0
Medium „	2	0	0	0	0	0	0	0	13	5	0	1	14	10	15
Small „	1	5	0	0	0	0	0	0	9½	4	0	0	19	11	15

These are merely given as a convenient size, but others may answer nearly as well.

Table No. 3, shewing the number of pairs, of different descriptions, allowed for each Train, with the Total weight.

Nature of Train.	Description of Scales.	No. of pairs allowed with sets of weights.	Weight of total of each description.					Total Weight with each Train.				
			cwt.	qrs.	lbs.	ozs.	drs.	cwt.	qrs.	lbs.	oz.	drs.
Train No. 1	Woodenlarge.	2	33	0	18	0	0	40	2	11	15	4
	Copper „...	6	4	0	11	6	0					
	„ Medium.	6	2	1	4	1	10					
	„ Small....	6	1	0	6	7	10					
Train No. 2	Woodenlarge.	1	16	2	9	0	0	21	2	4	15	8
	Copper „...	4	2	2	26	4	0					
	„ Medium.	4	1	2	2	11	12					
	„ Small....	4	0	2	22	15	12					
Train No. 3	Wooden large.	1	16	2	9	0	0	19	0	6	15	12
	Copper „...	2	1	1	13	2	0					
	„ Medium	2	0	3	1	5	14					
	„ Small....	2	0	1	11	7	14					

SCISSORS' LABORATORY.

Should be in length about 8 inches, weighing 3½ ozs. each; —They are used in cutting out Cartridge Bags, &c., &c. One pair is allowed for every piece of Ordnance.

Nature of Train.	Number allowed.	Total weight.	
		lbs.	ozs.
Train No. 1...	58	12	11
Train No. 2...	32	7	0
Train No. 3...	20	4	6

SEARCHERS.

New pattern and Single Pronged.

Searchers, with relievers, are sent from Europe, and are used in examining the bores of Ordnance to ascertain if any flaws exist. The Searcher consists of 6 or 8 prongs, with elastic steel springs, attached to a long wooden staff. The Reliever is an iron ring connected with an iron rod, passing through a hollow in the staff with a wooden handle at the end, instead of being attached to a separate staff as in the old pattern.

Searchers, single pronged, are made in Magazines.—They are merely slight rods of iron, attached to long wooden staves.—The end of the iron rod is brought to a tolerably fine point, and turned up about an inch.—They are used by placing a piece of wax on the point to take the impression of any hole or flaw in the bore of a piece of Ordnance.

Nature.		Total length of Reliever.	Length of Prongs.	Length of Staff.	Total Length.	Weight of each.
		ins.	ins.	ins	ins.	lbs.
Searchers..	with Reliever	107	18	106	124	18
	single Pronged	0	12	137	149	6

Nature of Train.	No. allowed.		Total weight.
	With Reliever.	Single Pronged.	lbs.
Train No. 1.	3	3	72
Train No. 2.	2	2	48
Train No. 3.	1	1	24

SERGE FOR CARTRIDGE BAGS.

Under this head the whole quantity of Serge required to make up the number of Bags allowed for the Train, has been entered.[*] A proportion therefore must be deducted, according to the number of Bags it is thought advisable to carry ready made up. The quantity of Serge required to make 100 Bags, will be found in Table No. 1, under the head " Bags Serge Cartridge empty."[†]

SIEVES.

With Tops and Receivers.

As used in Ordnance Laboratories, are all of equal dimensions, but bear different designations according to the material used for the bottom of the Sieve, viz. *Brass wire—Lawn—Hair*—Brass wire Sieves are in sets of three, having the meshes of the wire of different sizes, viz. the largest meshes run 576, Medium 1156, and the smallest 1444 to a square inch.

Leather tops and receivers are also required, but if one top and receiver is allowed for each set of Brass wire Sieves, it will be sufficient for the whole as well as for the Lawn, and hair Sieves.

The Sieves fit into the receiver, and the top fits on the Sieve.

The following are the dimensions.

Nature.	Exterior diameter. ins.	Depth. ins.	Total depth of top Sieve and receiver. ins.	Weight. lbs.
Brass wire...	22	8	15	4¾
Lawn	22	8		3
Hair............	22	8		4½
Top Leather..	22	5		3½
Receiver.......	22	8		5

Nature of Train.	No. allowed.				Total weight.
	Brass wire.	Lawn.	Hair	Tops and receiver.	
	Sets.				lbs.
Train No. 1.........	3	6	6	3	113
Train No. 2.... ...	2	4	4	2	75
Train No. 3...	1	2	2	1	35

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[*] Page 386.

[†] Page 385.

SOCKETS, PORTFIRE.

Are the same as described in the "Field Battery Tables." Two are allowed to each piece of ordnance.

SHOT, GRAPE CANISTER.

Canister Grape consists of the following parts,

A wooden bottom, an iron plate and bolt, a tin case, and cast iron shot.

The following Table will shew the quantities required for one round of each nature.

TABLE No. 1.

Nature.	Shot.		Case.					Bottom.				Iron plate.				Iron bolts.				Weight of case filled.	
	In each case.	Weight of each shot.	Length.	Diameter.	Weight.			Thickness.	Weight.			Thickness.	Weight.			Length.	Diameter.	Weight.			
	No.	ozs.	ins.	ins.	lbs.	ozs.	drs.	ins.	lbs.	ozs.	drs.	ins.	lbs.	ozs.	drs.	ins.	ins.	ozs.	drs.	lbs.	ozs.
24 Pdr. Iron Gun.	46	8	9·	5·629	1	0	12	2	1	6	0	Thick sheet iron which runs generally ⅛ in thick.	0	11	6	2	·3	0	8	25	8
18 " " "...	39	8	8·75	5·124	0	15	0	2	1	4	0		0	8	0	2	·3	0	8	21	10
10inch Iron Howz.	180	8	9·5	9·88	2	5	8	6	9	14	12		2	6	0	6	·3	1	14	102	12
8 " " "...	94	8	7·95	7·95	1	5	0	5	5	6	8		1	7	0	5	·3	1	14	54	3

Table No. 2, shewing the number and total weight of shot for each Train.

	Weight of each shot.	No. of shot required.	Weight.
	ozs.		lbs.
Train No. 1....	8	204,900	102,450
Train No. 2....	3	111,850	55,925
Train No. 3...	0	62,300	31,150

SHOT, GRAPE, CCFFIN'S.

Coffin's Grape, consists of the following parts,—an iron spindle, plates, and shot.—The plates are best when made of cast iron.

The following Table shews the quantity of materials required for one round of each nature.

To the wooden bottom a plate of sheet iron is added one tenth of an inch thick.

TABLE NO. 1.

Nature.	Shot.		Spindle.		Plates.		Wooden bottom.	Mean weight of 2 rounds of each.		
	In each round.	Weight of each.	Length below nut.	Diameter.	Diameter.	Thickness.	Thickness.			
	No.	lbs.	ins.	ins.	ins.	ins.	ins.	lbs.	ozs.	drs.
24 Pounder Iron Gun.	9	·2	8·2	·73	5·57	·41	·7	26	0	0
18 " " "...	9	1·5	7·1	·694	5·074	·31	·7	18	6	0

Table No. 2, shewing the number, and total weight of each nature of shot, for different Trains.

NATURE.	Train No. 1.		Train No. 2.		Train No. 3.	
	No. of shot.	Weight. lbs.	No. of shot.	Weight. lbs.	No. of shot.	Weight. lbs.
2 lbs.	2700	5400	1350	2700	900	1800
1½ lbs.	2700	4050	1350	2020	900	1350

SOLDER PEWTER.

Is used for soldering tin. One and a half pounds is allowed for each piece of Ordnance.

Nature of Train.	Quantity allowed. lbs.
Train No. 1...	87
Train No. 2...	48
Train No. 3...	30

SPIRITS OF WINE.

Used for priming Fuzes—Quick Match—Carcasses—generally used in all priming,—also occasionally used in fixing Shot to bottoms during wet weather.

Nature of Train.	Quantity allowed. Quarts.
Train No. 1..	175
Train No. 2...........	105
Train No. 3	60

SULPHUR REFINED.

Used in Portfire,—Blue Light—and Fuze Composition.

Nature of Train.	Quantity allowed. lbs.
Train No. 1.............	1000
Train No. 2...........	600
Train No. 3	400

TABLES LABORATORY.

Are used for rolling paper cases on &c.

Table. Length.	Table. Breadth.	Table. Thickness.	Tressels. Height.	Weight.
ins.	ins.	ins.	ins.	lbs.
168	30	2½	34	336

Nature of Train.	Number allowed.	Total weight. lbs.
Train No. 1...	3	1008
Train No. 2...	2	672
Train No. 3...	1	336

They are made up in Magazines, and are merely stout planks joined together, and laid upon Tressels.

TABLES MEALING.

Are used in Laboratories to meal Powder, and other ingredients on. They are made up in Magazines of Teak wood and consist of a tray, with a perpendicular frame all round. The breadth of the table at one end is contracted into about 9 inches, this part of the frame is made to slide in or out at pleasure, which admits of the ingredients after having been mealed, being swept out with a hand brush into a receiver, it is also convenient when cleaning the tables

This table is placed on two Tressels.

Extreme length.		Length to commencement of contraction.		Breadth of the widest end.		Breadth at the contracted end.	Height of the frame.	Height of the Tressels.	Weight.
ft.	ins.	ft.	ins.	ft.	ins.	ins.	ins.	ft.	lbs.
6	8	4	10	3	8	9	5	2½	186

Nature of Train.	Number allowed.	Total weight.		
		Cwt	Qrs	lbs.
Train No. 1 ..	3	4	3	26
Train No. 2 ..	2	3	1	8
Train No. 3 ..	1	1	2	18

TALLOW.

Is used in Carcass and Kit Compositions.

80lbs.	are	allowed	to Train	No.	1
50	„	„	„	No.	2
30	„	„	„	No.	3

TENTS EUROPEAN, NEW CONSTRUCTION.

The most convenient Tents for all purposes are those termed Eurpeans' Tents, and allowed for the accommodation of 16 men ; they have two flies, but only one set (in 4 pieces) of Canoughts to which both flies are attached. They are 20 feet, 6 inches long,—and 15 feet wide, with Canoughts 5 feet, 6 inches high, the poles which are made of bamboo, are 11 feet, 6 inches long,—the ridge pole is 6 feet. Total weight including Mallets, Pins, &c.

	Cwt.	Qrs.	lbs.	
2 Mallets 80 Pins.	5	1	„	1 Seleetah. 1 Pin Bag.

TENTS LABORATORY.

These tents are expressly intended to keep Powder in, they consist of two oval flies, extreme length feet, extreme breadth feet two canoughts each feet long, and feet high ; two door tops feet, and four door poles feet high ; two centre poles which are feet to the inner, and feet to the outerfly ; the ridge poles feet long ; there are two hollow wooden covers for the tops of the centre poles.

THREAD.

Worsted, Cotton, and Silk.

Thread Worsted, is used for forming the cup to quill Tubes. 12 ounces will do for about 1000 cups.

Thread Cotton is made up in skeins of single threads weighing about 2 ounces each, in which state it is served out to Magazines by the Commissariat, for Quick Match, it is then made up into strands of six threads, when one pound will give about 800 yards of match.

Thread Silk is used for sewing Cartridge bags, and is made up in skeins of 2 ounces each. It is supplied to Magazines from the Arsenal. See "Bags Serge Cartridge."*

The following is the quantity of each kind allowed for different sized Trains for Tubes, Quick Match, and Cartridge bags, but when any of these articles are served out ready made up, a proportionate quantity of thread will be deducted from the Indent.

Nature of Train, and description of Thread required.		Quantity allowed for different Ordnance.			Total of each kind.	Total of all kinds for each Train.	Remarks.
		Guns.	Howitzers.	Mortars.			
		lbs.	lbs	lbs.	lbs.		
Train No. 1	Worsted.......	26	10	22	58	174	This is calculated for loose Ammunition, if fixed Ammunition is used, the silk must be increased.
	Cotton.........	1	12	26	39		
	Silk...........	36	19	22	77		
Train No. 2	Worsted.......	13	5	14	32	99	See Table under head. "Bags Serge Cartridge"
	Cotton.........	½	8	15½	24		
	Silk..............	18	12	13	43		
Train No. 3	Worsted........	9	4	9	22	62	
	Cotton....... ..	¼	4	9¾	14		
	Silk............	12	6	8	26		

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* Page 385.

TUBES.

May be made either of Copper, Tin, Quills, or Paper, perhaps quill tubes on the whole are the best. Tubes however at present are not used in this service, when allowed they are given at the rate of one to each round of Ammunition, and $\frac{1}{5}$th spare.

Nature of Train.	No. of Tubes allowed.	Weight.
		lbs.
Train No. 1…………	78180	440
Train No. 2…………	43020	241
Train No. 3…………	26880	151

TURPENTINE.

Nature of Train.	Weight.
	lbs.
Train No. 1………………	35
Train No. 2………………	18
Train No. 3………………	11

See "Paint prepared."*

TWINE COUNTRY, NO. 1-2-3.

No. 1, is used for sewing Powder cloths, and Paulins, and in general for any vitry or canvass sewing, also for capping and bundling Fuzes.

No. 2, is used for tying Cartridges, sewing any thing of double gunny, and in spunge making.

No. 3, is used for sewing single gunny, tying Rockets on shafts, and packing up bundles of small stores.

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* Page 406.

Twine is made up into skeins, each skein weighing nearly as follows.

No. 1, 10 ounces
No. 2, 12 „
No. 3, 1 Pound.

It is supplied from the Commissariat to Magazines, Europe instead of country twine is frequently served out, but the country answers every purpose.

The following quantities are allowed for different Trains.

Nature of Train.	Description of Train.	Quantity of each allowed.	Total Weight.	Remarks.
		lbs.	lbs.	
Train No. 1	No. 1	110	410	Of No. 1, Twine 65lbs. for capping and bundling fuzes, 45 for general purposes, of No. 2, 185 for tying cartridge bags, and 65 for general purposes.
	No. 2	250		
	No. 3	50		
Train No. 2	No. 1	70	250	Of No. 1, 45 for capping and bundling fuzes, 25 for general purposes. Of No. 2, 105 for tying cartridge bags, and 45 for general purposes.
	No. 2	150		
	No. 3	30		
Train No. 3	No. 1	40	145	Of No. 1, 25 for capping and bundling fuzes, 15 for general purposes. Of No. 2, 65 for tying cartridge bags, 25 for general purposes.
	No. 2	90		
	No. 3	15		

N. B. About double the quantity will be required, when fixed Ammunition is used. See " Bags Serge."

WADS.

Compressed and Round.

Compressed wads are used with fixed Ammunition, that is, when the shot, as well as the charge of Powder is tied up in the cartridge bag, when the wad is placed between the charge and the shot.

One is required for every round shot.

Round wads are used with loose Ammunition, that is when the Powder only is contained in the cartridge bags, and the shot loose ; two are required for each round.

The following are the weight and dimensions of each.

Nature of Wads.		Diameter.	Thickness.	Weight of each		
		ins.	ins.	lbs.	ozs.	drs.
Compressed.	24 Pdr.....	5·5	1·3	0	4	8
	18 „	5·0	1·3	0	4	0
Round.	24 Pdr.............	5·6	0	1	2	0
	18 „	5·1	0	0	14	0

Nature of Train.	Nature of Wads.		Number allowed.	Weight of each Nature.			Total weight with Train.		
				Cwt.	qrs.	lbs.	Cwt.	qrs.	lbs.
Train No. 1..	Compressed.	24 Pdr.	12000	30	0	15	57	0	1
		18 „	12000	26	3	14			
Train No. 2...		24 „	6000	15	0	7½	28	2	0½
		18 „	6000	13	1	21			
Train No. 3...		24 „	4000	10	0	5½	19	0	0½
		18 „	4000	8	3	23			
Train No. 1..	Round.	24 Pdr.	24000	241	0	8	428	2	8
		18 „	24000	187	2	0			
Train No. 2...		24 „	12000	120	2	4	214	1	4
		18 „	12000	93	3	0			
Train No. 3...		24 „	8000	80	1	12	142	3	12
		18 „	8000	62	2	0			

WAX BEES.

Is used to wax thread for sewing cartridge bags, and allowed at the rate of 2ozs. for every 100 bags. It is also used for Kit. It is supplied to Magazines by the Commissariat.

The following is the quantity required for each Train.

Nature of Train.		For what purpose allowed.	Total with each Train.
		lbs.	lbs.
Train No. 1	Thread...	90	200
	Kit........	110	
Train No. 2	Thread...	50	110
	Kit.... ...	60	
Train No. 3	Thread...	30	60
	Kit.......	30	

WRAPPERS.

Are made of red Curwah Cloth, and are used to wrap round cartridges. They are useful in preventing the grains of Powder becoming broken and mealed from the jolting of the carriage in travelling.

They are allowed at the rate of half the number of round shot with each Train, as it is not supposed that a larger portion of cartridges will ever be carried filled.

Nature.	Dimensions		
	Length.	Breadth.	Weight of a 100.
	ins.	ins.	lbs.
24 Pounder	32	32	32
18 "	24	32	24

Nature of Train.		Number allowed.	Weight.
			lbs.
Train No. I.	24 Pdr...	4000	2240
	18 "	4000	
Train No. 2.	24 Pdr...	2000	1120
	18 "	2000	
Train No. 3.	24 Pdr..	1350	756
	18 "	1350	

The above are the size for fixed Ammunition, but are not inconvenient with loose cartridges, and it is therefore better to have them of one size.

(Signed)
S. Shaw, Lieut.-Colonel.
R. Powney, Lieut.-Col.—P C. O.
G. N. C. Campbell, Major.
R. G. Roberts, Captain.
A. Wilson, Captain.

(Signed) J. Dashwood,
Assistant Secretary Military Board.

LIST OF GENERAL STORES, SHEWING THE QUANTITY ALLOWED FOR TRAINS No. 1-2 and 3.

GENERAL STORES.	Train No. 1.		Train No. 2.		Train No. 3.		REMARKS.
	Number.	Weight lbs.	Number.	Weight lbs.	Number.	Weight lbs.	
Axes, felling with handles	58	754	32	416	20	130	
„ Pick „ „	58		32		20		
Axle-trees, Iron, Siege, Gun or Limber, spare	9	3825	5	2141	3	1234	
„ „ Cart or Waggon	7		4		2		
„ „ Wooden Mortar Bed	5		3		2		
Bags, Gunny for Charcoal	—	—	—	—	—	—	as required
Bamboos, large	50		35		20		
„ small	3000		2000		1000		
Bannerolls, with staves	48	279	36	209	24	139	
Baskets, rattan	—	—	—	—	—	—	as required
Barrels, for Tar	8	3064	5	1915	3	1149	
Bearers, for red hot shot	6	48	4	32	2	16	
Bill-hooks	58	116	32	64	20	40	
Blinds, for Embrazures, Gun	24	0	12	0	8	0	
„ „ Howitzer	10	0	6	0	3	0	
Chains, measuring	2	26	1	13	1	13	
Chalk	0	58	0	32	0	20	
Charcoal	0	8960	0	5040	0	3136	
Copper, sheet, thick sheets	12	516	8	344	4	172	
Crow-bars	2	720	12	360	8	240	
Colors Union Gun with staves	2	28	1	14	1	14	
„ Park „ „	2	20	1	10	1	10	
Forges, complete	5	0	3	0	2	0	
Frontlets 24 Pdr.	12	0	6	0	4	0	

GENERAL STORES.	Train No. 1.		Train No. 2.		Train No. 3.		REMARKS.
	Number.	Weight lbs.	Number.	Weight lbs.	Number.	Weight lbs.	
Frontlets.......18 Pdr.	12	0	6	0	4	0	
Ghurries, with Mallets.........	2	205	1	102½	1	102½	
Glasses, hour.........	4		2		2		
Gins, with blocks and tackle complete.........	2	2852	1	1426	1	1426	
Grate, with tongs for heating shot.........	4	140	3	105	2	70	
Hides, Corah.........	58	551	32	304	20	190	
Hooks, Shell.........pairs.	8	12	4	6	2	3	
Jacks, hand large.........	2	320	1	160	1	160	
„ „ small.........	2	260	1	130	1	130	
„ Lever.........	4	104	2	52	2	52	
Iron, Europe of sorts viz.........	0	2576	0	1456	0	896	The quantity of each kind to depend on the Officer receiving charge of train.
„ Flat bar 6½ inch.........							
„ „ „ 3 „							
„ Bolt.....1½ „							
„ „ 1½ „							
„ Rod.....¾ „							
„ „ ½ „							
Line, Seizing.........Skeins.	700	700	400	400	250	250	
Mamooties, with helves.........	58	464	32	256	20	160	
Oakum.........	0	100	0	60	0	40	See explanatory tables.
Perambulator.........	4	92	2	46	2	46	
Pickets, Park.........	200	2200	150	1650	100	1100	[platform.
Planks, Platform.........							⅓ the number in each
Platforms, Gun.........	24	0	12	0	8	0	

GENERAL STORES.	Train No. 1.		Train No. 2.		Train No. 3.		REMARKS.
	Number.	Weight lbs.	Number.	Weight lbs.	Number.	Weight lbs.	
Platforms, Howitzer	10	0	6	0	3	0	
„ Mortar	24	0	14	0	9	0	
Rakes for red hot shot	6	42	4	28	2	14	
Rammers, earth	20	400	15	300	10	200	
Ratline ... Coils.	8	320	5	200	2	80	
Rod, measuring, 10 feet	6	24	4	16	2	8	
„ „ 6 „	6		4		2		
Rope Europe, viz.							
„ 5½ Inch for Gin falls ... Coils.	2	7364	1	3682	1	2548	
„ 4 „ „ Drag ropes.	10		5		3		
Sheep skins	34	68	20	40	12	24	
Shovels	25	250	15	150	10	100	
Spades	25		15		10		
Steel, Europe blistered	0	58	0	32	0	20	
Stones, Grinding with Troughs	2	860	1	430	1	430	
Wax-cloth ... pieces	58	428	32	238	20	149	
Tools, chests of Carpenters	3	747	2	498	1	249	
Tools, chests of Smiths	3	699	2	466	1	233	
Tools, chests of Coopers	2	494	1	247	1	247	
Wrenches, common for Carts	57	399	29	203	17	119	

EXPLANATORY TABLES.

AXES FELLING AND PICK.

One of each is allowed for every piece of Ordnance equipped for Service, they are the same as used with Field Batteries, and are carried either by the Bilders, or on Hackeries.

NATURE.	Axe head.			Axe eye.		Handle.				
	Length of Axe.	Edge of Axe.	Thickness across Axe.	Diameter of	Depth of	Length of	Thickness at the eye.	Breadth at the eye end.	Diameter at small end.	Weight.
										lbs.
Felling........	8	3	2¼	1¼	1⅞	30	1⅜	0	1⅛	6½
Pick............	27	3	0	2	3	30	2¼	3¼	1½	6½

Nature of Train.	No. of each allowed.		Total weight for each Train.
	Felling.	Pick.	
			lbs.
Train No. 1.	58	58	754
Train No. 2.	32	32	416
Train No. 3.	20	20	130

AXLETREES IRON.

One spare Axletree is allowed to every four Guns and Howitzers equipped for service, and for every eight Carts or Waggons. All siege Gun Carriage and Limber axles are of the same dimensions, and all Cart and Ammunition Waggon axles, are the same as laid down in the Field Battery Tables.

For 5½ inch Wooden Mortar Beds, a spare axle is allowed for every two Beds.

The following Table will shew the dimensions and weight of each. They are carried on Hackeries.

NATURE.	Body.										Arm.									Shoulder washer			
	Length	Breadth	Depth at the Shoulder	Depth at the centre	Length from shoulder washer to fore lock key hole	Square and shoulder washer	Square at point	Length of forelock key hole	Breadth of the forelock key hole	Length of the square part	Total length of arm	Length from shoulder to washer	Length from outside shoulder washer to tinch hole	Length from shoulder washer to point	Diameter of arm at the shoulders	Diameter of arm at shoulder washer	Thickness of drag washer	Length of linch hole	Breadth of linch hole	Exterior diameter of	Thickness of iron	Total length from arm end to arm end	Weight
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Siege Gun or Limber…… .. ………	46	4	4	4	0	0	0	0	0	0	$18\frac{1}{2}$	0	15	0	0	4	1	$1\frac{1}{4}$	$\frac{5}{7}$	$6\frac{1}{2}$	1	85	320
Field Gun or Limber, Ammunition Waggons and Store carriages……. …………	48	$3\frac{1}{8}$	$3\frac{1}{8}$	$1\frac{3}{8}$	0	0	0	0	0	0	$16\frac{3}{4}$	13	0	0	3	0	1	1	$\frac{1}{2}$	0	0	$81\frac{1}{2}$	130
$5\frac{1}{2}$ inch Mortar wooden cheek Beds…….	0	0	0	0	$3\frac{3}{4}$	$1\frac{1}{2}$	$1\frac{1}{4}$	$\frac{3}{4}$	$\frac{1}{4}$	$6\frac{1}{4}$	0	0	0	6	$1\frac{3}{8}$	$1\frac{3}{8}$	0	$\frac{6}{8}$	$\frac{1}{4}$	3	$\frac{3}{4}$	13	7

Nature of Train.	Number of each description allowed.			Total weight with Train.
	Siege Gun Carriages & Limbers.	Cart or Waggon.	Wooden Mortar Bed.	lbs.
Train No. 1.	9	7	5	3825
Train No. 2	5	4	3	2141
Train No. 3.	3	2	2	1234

BAGS GUNNY FOR CHARCOAL.

Are allowed as required, weight of each bag 6 lbs.

BAMBOOS, LARGE AND SMALL.

Are allowed in small quantities not for any purpose in particular, but as being useful on many occasions.

They are allowed in the following proportions.

Nature of Train.	No. allowed.		Average weight with each Train.
	Large.	Small.	lbs.
Train No. 1......	50	3000	123250
Train No 2......	35	2000	82275
Train No. 3......	20	1000	41300

BANNEROLLS WITH STAVES.

Are used to mark out ground for the Park &c and for signals. The staves are made of Teak or other wood, having an 8 inch iron spike at top, and a 7 inch ferrule.

Staff.			Flag.			Total weight of each.	
Length including Spike and Ferrule.	Diameter.	Weight.	Length.	Breadth.	Weight.		
ins.	ins.	lbs.	ins.	ins.	ozs.	lbs.	ozs.
108	1½	5·8	42	30	5	5	13

Nature of Train.	Number allowed.	Total weight.	
		lbs.	ozs.
Train No. 1...............	48	279	0
Train No. 2...............	36	209	4
Train No. 3......	24	139	8

BASKETS RATTAN.

Are allowed as required.—Weight of each basket 2lbs.

BARRELS FOR TAR.

Are about 31 inches long, and 22½ inches diameter, and weigh when filled about 383lbs.

The tar is used for paying Platforms, and with grease for Axletree arms, and other purposes.

Nature of Train.	No. of Barrels allowed.	Total weight
		lbs.
Train No. 1..............	8	3064
Train No. 2..............	5	1915
Train No. 3..............	3	1149

BEARERS FOR RED HOT SHOT.

Nature of Train	Number allowed	Weight.
		lbs.
Train No. 1..............	6	48
Train No. 2..............	4	32
Train No. 3.......	2	16

BILL HOOKS.

One is allowed for every piece of Ordnance, and are carried in the Store Boxes.

They are used for cutting down branches of trees, clearing jungle, pointing stakes, &c.

Total Length.	Breadth from the front to the back edge.	Breadth from Bill point to the top of the back edge.	Length of the back edge.	Length of the handle.	Diameter of the handle.	Weight.
ins.	ins.	ins.	ins.	ins.	ins.	lbs.
16	4	7	6	6	1½	2

BLINDS FOR EMBRAZURES.

Are used to protect the Gunners when in Battery, they are made of 3 inch thick plank, and are faced with junk, or thick sheet iron. One is allowed for each Gun and Howitzer equipped for Service. They are made up in Magazines and carried on Hackeries.

CHAINS MEASURING.

Contain 100 links of one foot each, and weigh about 13lbs. each.

Nature of Train.	No. allowed.	Weight.
		lbs.
Train No. 1..........	2	26
Train No. 2..........	1	13
Train No. 3..........	1	13

CHALK EUROPE.

Is used to mark the position of Gun Carriages and Mortar beds on the platforms, and to mark the centre of metal.

One pound is allowed for every piece of Ordnance equipped for service.

Nature of Train.	Quantity allowed.
	lbs.
Train No. 1..............	58
Train No. 2..............	32
Train No. 3..............	20

CHARCOAL PICKED OR SCREENED.

The following quantities are allowed for the outfit of Trains, it is afterwards prepared in camp as required.

Nature of Train.	Quantity allowed.
	cwt.
Train No. 1..................	80
Train No. 2..................	45
Train No. 3..................	28

COPPER SHEET, THICK.

Is used for making and reparing Gun Ladles, Powder measures, Hoops for powder barrels, &c.

The sheets are of the following dimensions.

Length.	Breadth.	Thickness.	Weight.
ins.	ins.	ins.	lbs.
48	30	·1	43

Nature of Train.	No. of sheets allowed.	Total weight.
		lbs.
Train No. 1............	12	516
Train No. 2....	8	344
Train No. 3............	4	172

CROW BARS.

One is allowed to every Gun.

Nature of Train.	Number allowed.	Weight.
		lbs.
Train No. 1............	24	720
Train No. 2..................	12	360
Train No. 3	8	240

FLAG GUN WITH STAVE.

Is carried on the leading gun of the train. The Flag is made of Buntin, and the Staff of Teak or other wood.

STAFF.			FLAG			Total weight of Staff and Flag.
Length.	Diameter	Weight.	Length.	Breadth.	Weight.	
ins.	ins.	lbs.	ins.	ins.	lbs.	lbs.
168	1¾	10¾	96	66	3¼	14

Two are allowed for train No. 1—and one for trains of smaller size.

FLAGS PARK WITH STAVES.

Are union Flags made of Buntin, and hoisted in the Park. The Park Flag Staff is a Bamboo 40 or 50 feet long, served over with spunyarn, and is carried on the march by Lascars or Coolies. One Staff is only allowed for all Trains, and should the larger Trains be eventually divided, a second may be prepared in camp.

Two flags however are allowed for Train No. 1, and one for the smaller Trains.

Dimensions of Flags.		
Length.	Breadth.	Weight.
ins.	ins.	lbs.
216	144	10

FORGES COMPLETE.

Consist of Bellows 1—Tue iron 1—Anvil 1—Beak iron 1—Tong pairs 3—Hammers sledge 2—Hammers hand 1—Side set 1—Cutters anvil 1—Chisels hard 3—Punches round 3—Setter square 1—Pokers 1—Shovels 1—1 Medium Screw plate, and 1 plain jointer.

and are allowed as follows for,

Train No. 1	5
Train No. 2	3
Train No. 3	2

FRONTLETS.

Are used to protect the Gunner when laying a piece Ordnance, they are made of 4 inches thick plank, and are stuffed with Oakum or tow, on the side placed towards the enemy, so as to be Musket shot proof, they are placed on the gun in front of the vent-field, and are fixed to the Carriage by two long iron rods or supporters

They are made up in Magazines.—One is allowed to each piece of Battering Ordnance, and are carried on Hackeries.

GHURRY WITH TRIANGLE AND MALLET.

Two are allowed for Train No. 1, and one for the smaller Trains. Two one hour glasses will be sent with each Ghurry.

Triangle.				Ghurry.		Total weight Including Mallet.
Length of legs.	Diameter of		Weight.	Diameter.	Weight.	
	Top and bottom.	Centre.				
ins.	ins.	ins.	lbs.	ins.	lbs.	lbs.
87½	2⅛	2¾	36	19	64	102½

Nature of Train.	No. allowed.	Total weight.	No. of hour glasses.
		lbs.	
Train No. 1......	2	205	4
Train No. 2......	1	102½	2
Train No. 3......	1	102½	2

GIN WITH FALLS, BLOCKS &C. COMPLETE.

The arms and pry Pole are 16 feet 4½ inches long, and the windlass 6 feet.

Thirty yards of Europe 5½ inch rope are allowed for the Fall, and 16 for the sling.—The Blocks are iron with brass sheaves.—Gins are made up in Magazines, and the following Table will shew the weight of the several parts..

Two arms.	Pry Pole.	Roller or Windlass.	Shackle and Bolt.	Cross Bars with Bolts.		4 Handspikes.	3 Fidds.	Blocks.			Rope.		Total weight.		
				Upper.	Lower.			Single.	Double.	Treble.	Fall.	Sling.			
lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	cwt.	qrs.	lbs.
458	221	138	26	60	77	40	43	56	84	97	67	36	12	2	26

Nature of Train.	No. allowed.	Total weight.
		lbs.
Train No. 1…………	2	2852
Train No. 2…………	1	1426
Train No. 3…………	1	1426

GRATE WITH TONGS.

Is made of rod iron $\frac{5}{8}$ inch in diameter, and is used in heating shot.

	Number.	Height of legs.	Length.	Breadth.	No. of Bars including sides.	Total weight with each Train.
		ins.	ins.	ins.		lbs.
Train No. 1………	4	8	18	18	14	140
Train No. 2………	3					105
Train No. 3………	2					70

HIDES CORAH.

Are used for making leather straps, mending cartouches, and other purposes. One hide is allowed for each piece of Ordnance equipped for service, they weigh about 9½ lbs. each,

Nature of Train.	Number allowed.	Total Weight.
		lbs.
Train No. 1…………	58	551
Train No. 2…………	32	304
Train No. 3…………	20	190

HOOKS SHELL.

Are used to lift heavy Shells that are cast with ears or lugs; one pair are allowed for every howitzer and mortar of 10 inches diameter, the hooks are connected by a lashing attached to each handle, so as to prevent their opening out, when used in lifting the shells. They are carried in the Store Carts.

Total length of Hooks.	Exterior length of handle.	Exterior breadth of handle.	Diameter of metal.	Weight.
ins.	ins.	ins.	ins.	lbs.
7	3·5	2·5	·5	1·5

Nature of Train.	Number allowed.	Total Weight.
		lbs.
Train No. 1...........	8	12
Train No. 2...........	4	6
Train No. 3...........	2	3

JACKS HAND.

Used to raise a Carriage wheel from the ground, when required to take it off; also,

For throwing the gun back from the service to the travelling Trunnion holes, and which should always be done before a march, and vice versâ.

To admit of a gun being thrown back at once without shifting the Jack (which creates loss of time, and is inconvenient) a higher Jack is required than that used to take off Carriage wheels.

The operation is performed as follows, viz. the gun being limbered up, place the roller under it, just before the vent astragal, on the elevating board, and put a block of wood into the bore of the piece, then fix the claw of the iron rack work against the block, and close to the muzzle face, inclining the bottom of the Jack outwards, and under which (if the ground is at all soft) put a board,—then throw the pole up and lift, and the gun will gradually move back into the travelling Trunnion holes; when the Trunnions are clear of the Trunnion holes, handspikes may also be applied to assist in running the gun back;—they must be passed thro' between the spokes of the wheels.

To return the gun into the service Trunnion holes, incline the Jack the contrary way, and throwing the pole down, lift.

Two of each are allowed for Train No. 1
One for Train.................... No. 2
One for Train.................... No. 3
They are carried in the Store Cart.

	Block.			Extreme length of rack work above the block.	Width between the handles of windlass.	Length of the windlass handles.	Weight.
	Length.	Breadth.	Thickness.				
	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Large Jack....	36	13	6	19	20	10	From 130 to 160 lbs. each.
Small Jack.....	24	12	5	12	18	10	

JACKS LEVER.

Is used in taking off wheels of light Carriages, and is more conveniently and easier applied where it answers than the Hand Jack.

It consists of a Lever and prop, and the part of the lever that extends beyond the prop is placed under the axle-tree, and a man then bears down on the handle. A chain should be attached to the prop, and a hook to the handle of the lever, of sufficient strength to sustain the weight of the Carriage, when the wheel is off.

Three or four holes are made in the prop at different distances so that the height may be adapted to the axle-tree of the Carriage, the wheel is to be taken from.

Prop.			Lever.			Weight.
Length.	Breadth.	Thickness.	Total Length.	Greatest Breadth.	Length from the hole for prop pin to the end.	
ins.	ins.	ins.	ins.	ins.	ins.	lbs.
29	5	3·5	67·5	4·8	8·3	26

These may be made up in Magazines.
Four are allowed to Train No. 1
Two to Train.......... No. 2
Two to Train.......... No. 3

They are carried in the Store Carts.

IRON EUROPE OF SORTS.

The Iron is required for the repairs of Wheel tires, Carriage bolts, Axletrees, Draft chains, and various other purposes. The quantity allowed for each Train will be as follows.

Nature of Train.	Total weight.
	lbs.
Train No. 1..........	23
Train No. 2..........	13
Train No. 3..........	8

The following are useful kinds of Iron.

Flat bar 6½ inch for Tires Siege Carriage.

„ „ 3 „ „ „ Waggons and Carts.

Bolt 1¼ and 1½ inch for Carriage bolts.

Rod 0·75 and 0·5 inch for Draft chains.

The different proportions should be regulated in some measure by the service the Train may be intended for.

LINE SEIZING.

Is used on the march for lashings as required.

One skein measures and weighs as follows, vizt.

	Size when rolled up.		Line.		Weight.
	Length.	Diameter.	Length.	Circumference.	
	ins.	ins.	ins.	ins.	lbs.
Skein..	9¾	2½	350	1	1

The following quantity is allowed for each Train.

Nature of Train.	Skeins.	
	No.	Total wt. lbs.
Train No. 1..........	700	700
Train No. 2..........	400	400
Train No. 3..........	250	250

Different sized Line is sometimes used, but the above is convenient.

The greater portion should be carried on the Hackeries or Store Carts, the rest in Store and Limber boxes of Guns and Waggons.

Mamooties or Fourahs.

Are used to clear obstructions on the roads, and are the same as used with Field Batteries.

They are carried by the bildars, or lashed to the Carriages, and one is allowed to each piece of Ordnance. The size and weight are as follows, viz.

	Mamootie.						Handle.			
	Length of blade.	Breadth of blade.	Thickness at shoulder.	Thickness at edge.	Thickness of the neck.	Diameter of eye.	Length.	Diameter at thick end.	Diameter at small end.	Weight.
	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	ins.	lbs.
Mamootie........	11	9	¼	⅛	1¼	1⅓	30	1⅝	1⅛	8

One is allowed for every piece of Ordnance.

Nature of Train.	No.	Total weight.
		lbs.
Train No. 1	58	464
Train No. 2	32	256
Train No. 3	20	160

OAKUM.

Is used in packing Shells, the quantity required will vary according to the mode of packing.

It is also used in wiping the vent of Guns after firing, and by Siklegars and Lascars in cleaning elevating screws, and different implements.

Besides what may be required for packing, the following is allowed for each Train.

Nature of Train.	Total weight.
	lbs.
Train No. 1	100
Train No. 2	60
Train No. 3	40

PERAMBULATORS.

Are used for measuring distances, and when not required, are carried on Hackeries.

	Length.		Breadth.		Weight.
	Feet.	Inches.	Feet.	Inches.	lbs.
Double wheeled, Mahogany wood	4	3	1	2	23

The following are allowed.

Nature of Train.	No.	Total weight.
		lbs.
Train No. 1	4	92
Train No. 2	2	46
Train No. 3	2	46

PICKETS PARK.

Are used for supporting the line round the Park, they are carried on Hackeries.

	Length.	Diameter	Weight.
	ins.	ins.	lbs.
Pickets Park.	52	3	11

The following number are allowed.

Nature of Train.	No.	Total weight.
		lbs.
Train No. 1..................	200	2200
Train No. 2......	150	1650
Train No. 3..................	100	1100

PLANKS PLATFORM.

Are allowed at the rate of ⅓ the number of Planks to each Platform.—Weight of each plank lbs. 218.

PLATFORMS.

	Sleepers.				Planks.				Pins.			
	Number.	Length.	Breadth.	Thickness.	Number.	Length.	Breadth.	Thickness.	Number for each Platform.	Length.	Diameter.	Total weight.
		feet.	ins.	ins.		feet.	ins.	ins.		ins.	ins.	cwt.
24 & 18Pdrs. 10&8 in. how.	5	17½	6	5	17	10	12	2½	170	9	1	21¼
10—8 and 5½ inch Mortars.	3	7½	4	8	7	4	12	3	48	11	1	9

One sized Platform is used for all Battering Guns and Howitzers, and one of smaller dimensions for all Mortars.

RAKES FOR RED HOT SHOT.

Nature of Train.	Number.	Weight.
		lbs.
Train No. 1	6	42
Train No. 2	4	28
Train No. 3	2	14

RAMMERS EARTH.

Are blocks of wood, flat at the bottom, attached to long staves, and are used when it is requisite to beat down loose earth.—They are carried on Hackeries.

	Staff.		Block at bottom.		
	Length.	Diameter.	Length.	Breadth.	Weight.
	ins.	ins.	ins.	ins	lbs.
Rammers Earth...	54	1¾	13	9	20

The following are allowed exclusive of what may be carried as Engineer Stores.

Nature of Train.	Number.	Total weight.
		lbs.
Train No. 1	20	400
Train No. 2	15	300
Train No. 3	10	200

RATLINE.

Is cord of 1½ inch in circumference, and used for inclosing the Park.

It is made up in coils 120 fathoms each, each coil weighing about 40lbs.—It is carried on Hackeries.

The following is allowed for each Train.

Nature of Train.	No. of Coils.	Total weight.
		lbs.
Train No. 1...............	8	320
Train No. 2...............	5	200
Train No. 3...............	2	80

Rods, Measuring of Sizes.

Are used in measuring short distances, Rope &c., some are 10 feet, others 6 feet long, and both kinds 1 inch square, the 10 feet rods weighing about 2½lbs; and the 6 feet rods 1½lbs. They are marked off in feet and inches, and are carried on Hackeries.—The following number are allowed.

Nature of Train.	No. of Rods.		Total weight.
	10ft.	6ft.	lbs.
Train No. 1...............	6	6	24
Train No. 2...............	4	4	16
Train No. 3...............	2	2	8

Rope, Europe or Country.

5½ inch rope is used for Gin falls and slings, and 46 yards are required for each fall and sling, besides one set ready cut for each Gin, spare rope should be carried to replace wear and tear.

4 inch rope is used for Drag ropes, and besides those allowed, spare rope is required to replace those that may be worn out.

The following Tables will shew the quantity in each coil, with the weights and quantity allowed for each Train.—Spare rope is carried on Hackeries.

Nature of Rope.	Diameter inches.	Yards in each Coil.	Weight.
			lbs.
Gin falls and slings.	5½	240	847
Drag ropes.......	4	240	525

Nature of Train.	Coils allowed.		Total weight.
	5½ inch.	4 inch.	lbs.
Train No. 1..	2	10	6944
Train No. 2..	1	5	3472
Train No. 3..	1	3	2422

SHEEP SKINS.

Are used in Batteries to put over the muzzle of Mortars and Howitzers, to prevent the charge being ignited by sparks falling into the bore, when the pieces are discharged.

They average something under 2 lbs. weight each.—The following are the numbers allowed, being at the rate of one to each Mortar, and Howitzer.

Nature of Train.	No. allowed.	Total weight.
		lbs.
Train No. 1........ ...	34	68
Train No. 2..............	20	40
Train No. 3	12	24

SHOVLES AND SPADES.

Are used for digging trenches and other work, they weigh about 5lbs. each, and are carried on Hackeries.—The following number are allowed.

Nature of Train.	Shovels.	Spades.	Total weight.
			lbs.
Train No. 1................	25	25	250
Train No. 2.	15	15	150
Train No. 3.......	10	10	100

STONES GRINDING WITH TROUGH.

Are used for sharpening Tools &c. they are of various sizes, but the following is a convenient one viz. Stone 4½ inches thick, and 28 inches in diameter, this with the iron handle &c. weighs about 224lbs. and the wooden Trough about 206lbs. They are allowed in the following proportions.

Nature of Train.	No. allowed.	Total weight.
		lbs.
Train No. 1.	2	860
Train No. 2........ ...	1	430
Train No. 3............	1	430

STEEL BLISTERED.

Is used for repairing various implements, and is allowed in the following proportions.

Nature of Train.	Quantity allowed.
	lbs.
Train No. 1	58
Train No. 2	32
Train No. 3	20

TOOLS CHEST OF

The number of Chests are allowed as follows.

	Carpenters.	Smiths.	Coopers.	Total weight.
	No.	No.	No.	lbs.
Train No. 1	3	3	2	1940
Train No. 2	2	2	1	1211
Train No. 3	1	1	1	729

A CARPENTER'S CHEST.

Contains.

	No.		No.
Adzes with helves	1	Files for saws cast steel	12
Augers with handles ½ inch	1	„ half round bastard, cut 8 in.	1
„ „ „ ⅝ „	1	„ „ „ „ „ 10 „	1
„ „ „ ¾ „	1	„ „ „ „ „ 12 „	1
„ „ „ ⅞ „	1	Gimlets, common	12
„ „ „ 1 „	1	„ spike	2
„ „ „ 1¼ „	1	Gouges, cast steel, firmer of sizes.	3
Awls Brad	4	„ sockets 1 inch	1
Axes, Broad with helves	1	„ „ ¾ „	1
Chisels, Cast steel, firmer of sizes.	8	„ „ 1½ „	1
„ „ „ Mortise	3	Gouges, wood common	1
„ „ „ Socket from ⅝		„ „ Mortise	1
to 1¾ inch	6	Hammers, claw with handle	1
Compasses, steel with sweeps 12		„ rivetting „ „	1
in pair	1	Handles, for files of sizes	6
„ „ „ „ 5		Hatchets with helves	1
in pair	1	Knives drawing	1

CARPENTERS CHEST,—continued.

	No.		No.
Mallets........................	1	Rasps, half round 14 inch........	3
Pincers common. ....pair.	1	Rules, box 2 feet, with brass slide	1
Nippers „ .... „	1	Saws hand.................. .	1
Planes, fore double iron.........	1	„ tenon.....................	1
„ jack „ „	1	„ sash	1
„ „ single „	1	Screw drivers..................	2
„ smoothing double iron..	1	Setters saw....................	1
„ „ single „ ..	1	Shaves spoke large.............	1
„ trying double „ ...	1	„ „ small.............	1
„ moving fillister...........	1	Squares with steel blades.......	1
„ plough with 8 irons......	1	Stocks centre with 24 bits.......	1
„ rebate 1½ inch..........	1	Stones, turkey or oil, stocked.....	1
„ „ 1 „	1	„ rag......................	1
Pots, glue copper with brushes...	1	Vices bench....................	1
Punches, brad of sizes.........	6	„ hand..................	1

A BLACK SMITH'S CHEST.

Contains.

	No.		No.
Anvil small...................	1	„ hand.....................	1
Braces........................	1	„ rivetting with handle...	1
Callipers................ .pair.	1	„ square set....	1
Chisels rod............	6	Hammers sledge.........	1
„ hard.....................	3	„ side set..............	3
Compasses with sweep 15 inch.	1	Handles for files of sizes........	12
........................pair		Plyers........................ pair.	1
Counter sinks for braces.........	1	Poker....	1
Cutters for anvils............	1	Pinchers hard of sorts...	6
Drills stock with 12 bits bow and		„ rod „	6
catgut......................	1	Rimers square for braces..........	2
Files, flat rough 14 inch..........	3	Rules box 2 feet with brass slide	1
„ „ „ 12 „	3	Screw plate with 5 plug & 2 taper	
„ „ „ 10 „	3	taps........................	1
„ „ „ 8 „	3	„ hand with 14 taps.........	1
„ half round 14 „	3	Slices.............	1
„ „ „ 12 „	3	Squares iron figured 18 inch......	1
„ „ „ 10 „	3	Tongs forging ....pairs.	5
„ „ „ 8 „	3	Vices bench	1
„ three square bastard cut 14in.	6	„ hand.........	1
„ „ „ „ „ 10 „	6	„ standing.................	1
Hammers broad......	1		

A Cooper's Chest,

Contains

	No.		No.
Adze trimming with helves	1	Knives drawing	1
Axes 12 inch ,, ,,	1	,, heading	1
Beak iron	1	,, hollowing	2
Bits centre cock for dowling stock	12	Pincers 11 inch pairs.	1
,, ,, taper ,, ,,	12	Plane jack double iron	1
Bolster	1	,, smoothing	1
Barers bung	2	,, tapping	1
,, tap	2	Punches hard	6
Chequered Poled with helve and		Rasps half round of sorts	6
claw	1	Rules gauge 4 feet	1
Chisels hard	6	Saw hand	1
Compasses with sweeps 14 inch		,, compass	1
pairs	1	Shaves round 1 handle	2
Dowling stock with 24 bits	1	,, ,, 2 ,,	2
Drivers	6	,, spoke belly	1
Files herring bone	6	,, ,, for over cross	1
,, hand saw	12	,, ,, tapping	1
,, half round	6	Stocks crow with 2 irons for butt.	1
Gimblets common	12	,, ,, for kilderkins	1
Hammers claw with handle	1	,, ,, for rundlet	1
,, hand ,, ,,	2	Stones rag	2
Handles for files	6	,, oil turkey not stocked	1
Howels with handles	2	Vices	6
Iron flagging	2	,, sheave	1
,, marking	2	Saw set	1
Jiggers	2	Chincing irons	3
Knives cleaning with handles	2		

Wax Cloth.

Is used for the packing of Powder Barrels, and protecting Elevating screws, Fuzes &c. from wet.

One piece is allowed for every piece of Ordnance. Length 12 yards; breadth 1 yard; weight 7 lbs. 7 oz.

Nature of Train	No. of pieces.	Weght
		lbs.
Train No. 1	58	431
Train No. 2	32	238
Train No. 3	20	149

Wrenches common for Carts.

One is allowed for every Train Cart.—For description see "Implements" "Explanatory Tables" Page 370.

(Signed)
S. Shaw *Lieut. Col.*
R. Powney *Lieut. Col. P. C. O.*
G. N. C. Campbell *Major.*
R. G. Roberts *Capt.*
A. Wilson *Capt.*

(Signed.) J. Dashwood,
Assist. Secy. Mil. Board.

LIST OF STORES FOR SIEGE TRAINS, ARRANGED ALPHABETICALLY.

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
384	372	Antimony	......	131	......	75	......	50	
432	429	Axletrees, Iron, Siege, Car.	9	3825	5	2141	3	1234	
„	„	„ Field „	7		4		2		
„	„	„ Wooden Mortar	5	......	3		2	......	
434	„	Bags Gunny, for Charcoal	......	......	......	......	......	......	as required
„	„	Bamboos, large	50	123250	35	82275	20	41300	
„	„	„ small	3000		2000		1000		
387	372	Barrels, Budge	34	655	18	347	11	212	
„	„	„ 100 lbs	3535	116655	1897	62601	1151	37983	
„	„	„ 60 lbs	57	1254	39	858	29	638	
435	429	„ for Tar	8	3064	5	1915	3	1149	
„	„	Baskets, rattan	......	......	......	......	......	......	as required
322	330	Beds, Mortar, Iron, 10 Inch	4	9808	2	4904	1	2452	with 2 coins each
„	„	„ „ „ 8 „	10	12400	6	7440	4	4960	
„	333	„ „ Wooden with E. S. 5½ Inch	12	3108	7	1813	5	1295	including 2 spare in No. 1, and 1 in No. 2&3 Trains
436	429	Blinds, Embrasure, Gun	24	2160	12	1080	8	720	of the same pattern
„	„	„ „ Howitzer	10	......	6	......	3		
390	372	Boilers, Copper, large	3	336	2	224	1	112	
„	„	„ „ medium	3	240	2	160	1	80	
„	„	„ „ small	3	144	2	96	1	48	
„	„	„ Iron, large	3	306	2	204	1	102	or Pots Iron
„	„	„ „ medium	3	132	2	88	1	44	
„	„	„ „ small	3	165	2	110	1	55	

Explanatory table page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
390	372	Borax	....	26	....	16	....	8	
391	„	Boxes, packing, spherical case........	550	15000	300	8300	184	5023	
„	„	„ „ light ball..........	15	600	8	320	5	200	
„	„	„ „ signal Rocket......	3	87	2	58	1	29	
„	374	„ „ Fuzes............	95	4107	57	2469	32	1397	
392	„	Brass Cast..........................	....	58	....	32	....	20	
„	„	„ Hammered......................	....	58	....	32	....	20	
„	„	Brushes, mealing table............	68	36	40	24	24	14	
„	„	„ Hearth................	34		20		12		
„	„	„ Paint....................	17	7.14	9	4.2	6	2.12	
348	344	Buckets, Gun.................:	58	484	32	256	20	160	
393	374	Buntin...........................yds.	129	13⅛	86	9	43	4 ½	Blue, Red and White
„	„	Candles, wax......	....	116	....	64	....	40	
349	344	Caps canvas, spunges, gun...........	48	26	24	13	16	810	
„	„	„ „ „ 10 In. Howr.,..	8	6	4	3	2	1.8	
„	„	„ „ „ 8 In. Howr.....	12	6	8	4	4	2	
„	„	„ „ „ Mortar........	48	26	28	15.3	18	9.12	
352	„	„ „ Muzzle Howr. & Mortar.	8	12	4	6	2	3	
„	„	10 Inch							
„	„	„ „ „ „ „ 8 Inch	16	24	10	15	6	9	
„	„	„ „ „ „ „ 5½ Inch	10	5	6	3	4	2	
384	372	Cartridges empty, serge, 24 pdr......	13500	1580	6750	8100	4500	540	To hold powder ⅓ of shots weight
„	„	„ „ „ „ „ „	2700	216	1350	106	900	72	„ „ „ ⅙
„	„	„ „ „ „ 18 „	13500	1350	6750	675	4500	450	„ „ „ ⅓

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight. lbs.	No.	Weight lbs.	No.	Weight lbs.	
384	372	Cartridges, empty, serge, 18 pdr....	2700	180	1350	90	900	60	To hold powder ⅛ of shots weight.
„	„	„ „ „ 10 Inch Howr..	4950	931	2475	466	1238	233	
„	„	„ „ „ „ 8 „	8100	790	5400	589	2700	263	
„	„	„ „ „ 10 Inch Mortar.	4500	270	2250	135	1125	67½	
„	„	„ „ „ 8 „ „	11531	547.11	6919	328	4613	219.5	
„	„	„ „ „ 5½ „ „	11813	413.7	7088	248	4725	165.6	
322	328	Carriage, siege, with Limber and E. S. N. P. for Iron Gun 24 pdr ...	14		7		4	}	2 spare with No. 1
„	„	E. S. N. P. for Iron Gun 18 Pdr....	14		7		4		1 „ „ „ 2
„	„	„ „ „ „ „ „ Howr. 10 Inch.	5		2		1	}	1 „ „ 1 & 2
„	„	„ „ „ „ „ „ „ 8 „	7		5		2		
„	331	Carriages Carts, Arty. Common........	6		4		2		Formerly called Qr. Master's carts.
„	„	„ „ „ Limber R. P..	24		12		6		
„	„	„ „ Platform with L. R. P.	27		15		9		
342	„	„ Transport..............	3		2		1		
350	326	Chains draft, Pole, siege..........	40	2020	21	1061	11	555	
354	„	„ „ Leading „	523	18135	272	6868	148	4237	
356	„	„ Locking „	40	1160	21	609	11	319	or Carts with Limbers.
354	„	„ Draft Pole, Cart..............	51	1632	27	864	15	480	
350	„	„ „ „ Transport Carriages.	3		2		1		
„	„	„ „ „ Field „	6	144	4	96	2	48	
„	„	„ „ Leading „ „	143	2551	78	1326	52	884	

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight. lbs.	No.	Weight lbs.	No.	Weight. lbs.	
356	326	Chains, Locking, Field Carriages....	51	663	27	351	15	195	
436	429	Chalk, Europe....................		58		32		20	
”	”	Charcoal..........................		8960		5040		3136	
353	244	Clipbands.........................	200	795	108	418	58	225	New pattern, if old are sent, swivels must accompany them.
369	”	Collars Tompion...................	24	7.8	12	3.12	6	2.8	
434	429	Colors, banneroll, with staves.......	48	279	36	209	24	139	
438	”	” Union, 18+12 feet..........	2	20	1	10	1	10	
437	”	” ” 8+5½ ”	2	28	1	14	1	14	with staves.
399	374	Composition Kit..................		102		60		36	
404	”	” Mixers..................	12	24	8	16	4	8	
404	”	” Paddles.................	18	94½	12	63	6	31½	
413	376	” Rubbers..................	6	72	4	48	2	24	
437	429	Copper sheet thick, sheets.........	12	516	8	344	4	172	
”	”	Crowbars.........................	24	720	12	360	8	240	
359	344	Dragropes, siege, Ordnance Sets....	125	7000	69	3864	41	2396	
”	”	” ” Field ”	57	1169	31	635	17	340	
360	344	Esses Iron........................	360	279	192	153	102	79	
394	374	Flour		80		40		20	
395	”	Former's Cartridge, 24 Pounder.....	12		6		4		
”	”	” ” 18 ”	12		6		4		
”	”	” ” 10 Inch Howr...	4		2		1		
”	”	” ” 8 ” ” ..	6	89	4	48	2	29	If Cartridges are carried ready made, most of these may be dispensed with.
”	”	” ” 10 Inch Mortar.	4		2		1		
”	”	” ” 8 ” ”	10		6		4		
”	”	” ” 5½ ” ”	10		6		4		

Explanatory Table. Page.	Page.	STORES.	Train No 1.		Train No. 2.		Train No. 3.	
			No.	Weight. lbs.	No.	Weight. lbs.	No.	Weight. lbs.
438	429	Frontlets..................24 Pdr.	12	642	6	321	4	214
430	„	„ ....18 „	12	612	6	306	4	204
395	374	Fuzes empty, common, 10 Inch....	9600	3264	4800	1632	2400	816
„	„	„ „ „ 8 „	19,200	5280	12000	3300	7200	1980
„	„	„ „ „ 5½ „	12000	1620	7200	972	4800	648
„	„	„ „ Spherical 1st Size......	720	40	480	26	240	13
„	„	„ „ „ 2d „	2880	95	1440	48	960	32
398	398	Funnels, Tin....................	40	5.8	22	3	12	1.9
439	430	Ghurries, with mallets.............	2	80	1	40	1	40
„	„	Gins complete, with falls, blocks, &c....	2	2852	1	1426	1	1426
„	„	Glasses, hour	4	4.8	2	2.4	2	2.4
398	„	„ spying........	20	77.8	11	42.10	6	23.4
396	374	Glue....................................		58		32		20
397	„	Grease..........		80		50		30
398	398	Guages, brass, shot and shell, high...	4	66	2	33	1	16.8
„	„	„ „ „ „ „ „ low...	4	66	2	33	1	16.8
397	374	Gunny, double, pieces..................	290	1305	160	720	100	450
	324	Half wrought, materials Field Carriage						
	„	„ Axletree beds, Carriage...... ..	4	754	2	376	1	188
	„	„ „ „ Limber..........	4		2		1	
	„	„ Felloes..........................	96	1344	48	672	24	336
	„	„ Naves............................	16	744	8	372	4	186
	„	„ Spokes............................	192	1144	96	572	48	286
	„	„ Poles..............................	8	460	4	320	2	115

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.	
			No.	Weight. lbs.	No.	Weight. lbs.	No.	Weight. lbs.
	324	Half wrought materials Siege Carriage						
	„	„ Axletree bed	6	756	4	504	2	252
	„	„ Beams, Howitzer 10 inch	1	275	1	275	1	275
	„	„ „ „ 8 „	1	195	0	0	0	0
	„	„ Cheeks, 24 or 18 Pdr	4	2408	2	1204	2	1204
	„	„ „ 10 inch	1	819	1	819	1	819
	„	„ „ 8 „	1	603	1	603	1	603
	„	„ Felloes, Carriage	36	1323	24	882	12	441
	„	„ „ Limber	36	1110	24	740	12	370
	„	„ Naves	12	872	6	436	6	436
	„	„ Pole	6	483	4	322	2	161
	„	„ Spokes, Carriage	72	819	48	546	24	273
	„	„ „ Limber	72	762	48	508	24	254
	„	„ Transoms, Breast } 24 or 18 Pdr.	8	328	4	164	2	82
	„	„ „ Centre	8	568	4	284	2	142
	„	„ „ Trail	8	568	4	284	2	142
	„	„ „ Breast, 10 inch	2	154	1	77	1	77
	„	„ „ „ 8 „	2	92	1	46	1	46
	„	„ „ Centre, 10 „	2	164	1	82	1	82
	„	„ „ „ 8 „	2	98	1	49	1	49
	„	„ „ Sliding, 10 „	2	172	1	86	1	86
	„	„ „ „ 8 „	2	106	1	53	1	53
	„	„ „ Trail, 10 „	2	172	1	86	1	86
	„	„ „ „ 8 „	2	106	1	53	1	53

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
361	344	Handspikes common	208	0	112	0	64	0	
362	„	„ traversing spare	56	0	28	0	16	0	
„	„	„ Iron Mortar	28	0	16	0	10	0	[to put round fuzes.
		Hides Bullocks	2	0	1	0	½	0	For stripes of leather
440	430	„ Corah	58	551	32	304	20	190	
„	„	Hooks for shells pairs	8	2	4	6	2	3	
374	398	Implements, Fuze							
	„	„ Augers brace	40	69-6	22	38-2	12	20-13	
	„	„ „ hand	40	14	22	7-8	12	4	
388	372	„ Benches	17	1428	9	756	6	504	
389	„	„ Blocks driving	17	.2074	10	1220	6	732	
„	„	„ „ setting	17	4250	10	2500	6	1500	
398	374	„ Drifts (4 in set) Sets	32	42	16	21	8	10-8	
„	„	„ Engines	8	178	4	89	2	44·8	
„	„	„ Graduators	40	14-6	22	7.15	12	4-5	
388	372	„ Fuze Knives	17	68	9	36	6	24	
398	„	„ Ladles comp.	32	1-3	16	0-9	8	0·4·6	
„	„	„ Mallets (driving or setting) large	56	98	30	52-8	16	28	
„	„	„ small	56	56	30	30	16	16	
„	„	„ Markers	40	16-4	22	8-15	12	4-14	
„	„	„ Pincers fuze	40	44	22	25	12	22	
„	„	„ Setters 10 inch	40	71-4	22	39-3	12	21-6	
„	„	„ „ 8 „	40	22-8	22	12-6	12	6-12	
„	„	„ „ 5½ „	40	25	22	13-12	12	7-8	

Explanatory Table: Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
398	374	Implements Vices Bench	20	189	11	104	6	56-8	
„	„	„ „ Hand	20	11-11	11	6-6	6	3-8	
		Implements Gun							
346	344	„ Aprons canvas	34	31	18	16½	11	10	
„	„	„ Bits Gimblet	58	11	32	7	20	4	
„	„	„ „ Gun	58		32		20		
348	„	„ Boxes tube	58	54-6	32	30	20	18-12	With belts attached.
352	„	„ Cases Portfire	116	174	64	96	40	60	
359	„	„ Drifts	58	7½	32	4	20	2¾	
360	„	„ Hammers claw with turn-screw	58	127	32	70	20	43	
365	„	„ Linstocks	29	72	16	40	10	25	
348	„	„ Clippers Portfire	58	139	32	77	20	48	With blocks.
412	376	„ Pincers Gun	58	116	32	64	20	40	
367	344	„ spikes jagged	116	9-12	64	6-4	40	4	
„	„	„ „ spring	116		64		40		
370	„	„ Wires priming	116	12	64	6½	40	4	
		„ loading howitzer							
411	376	„ Pincers 10 inch	4	36	2	18	1	9	
„	„	„ „ 8 inch	6	43½	4	29	2	14½	
	213	„ hot shot							
	„	„ Bearers	6	48	4	32	2	16	
440	430	„ Grates	4	140	3	105	2	70	
447	431	„ Rakes or Forks	6	42	4	28	2	14	
440	430	„ Tongs	4		3		2		

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
		Implements proving shells..........							
398	”	” Bellows................	4	24	2	12	1	6	
”	”	” Callipers bottom	4	54	2	27	1	13½	
”	”	” ” side 1st size...	4		2		1		
”	”	” ” ” 2nd ” ...	4		2		1		
”	”	” ” ” 3d ” ...	4		2		1		
”	”	” ” ” 4th ” ..	4		2		1		
”	”	” Hammers..............	4	4	2	2	1	1	
”	”	” Scrapers................	4	2	2	1	1	½	
”	”	Instruments.........................							
”	”	” Callipers Brass Guns large.	8	26	4	13	2	6½	
”	”	” ” ” ” small.	8	4	4	2	2	1	
”	”	” Mathematical cases........	4		2		1		
”	”	” Chains measrg. brass 100 feet	2	26	1	13	1	13	
”	”	” Perpendiculars, Gunners....	20	2	11	1	6	¾	
445	430	” Perambulators single......	4	92	2	46	2	46	
398	398	” Quadrants spirit.............	20	100	11	55	6	30	With Cases.
399	”	” Scales, Gunters Brass.....	20	28	11	15¼	6	8¼	
443	430	Iron flat bar 6½ inch..............		2576		1456		896	The quantity of each kind at the discretion of officers taking charge.
”	”	” ” ” 3 ”							
”	”	” Bolt 1½ ”							
”	”	” ” 1¼ ”							
”	”	” Rod ¾ ”							
”	”	” ” ½ ”							
441	430	Jacks hand large..................	2	320	1	160	1	160	

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
441	430	Jacks hand small	2	261	1	130	1	130	
442	”	” Lever	4	104	2	52	2	52	
364	344	Kegs filled with tar and grease	100	2600	54	1404	19	499	Exclusive of those on [Carriages.
”	”	Keys for cap squares spare	80	40	42	21	22	11	
400	374	Knives laboratory	58	15	32	6	20	4	
364	344	Ladles copper gun 24 pdr	3	35¼	2	23½	1	11¾	with Wadhooks.
”	”	” ” ” 18 ”	3	31½	2	21	1	10½	
400	374	Lanterns dark	12	12¾	8	8½	4	4¼	
”	”	” muscovy	12	33¾	8	22½	4	11¼	
”	”	” tin	12		8		4		
400	”	Lead pig		20		15		10	
401	”	Light balls 5½ inch	150	900	75	450	50	300	
402	”	Line log skeins.	116	159	64	88	40	55	
443	430	” seizing prepared. ”	700	700	400	400	250	250	These are the same as in [field batteries.
393	374	Linen Dosootie white yards	200	93	150	70	100	46½	
402	”	Match, gun cotton skeins	246	123	132	66	84	42	
403	”	” ” quick yards	31200	300	19200	185	11200	108	
”	”	Measures copper canister small sets.	20	340	11	187	6	51	8, 6, 5, 4, 3, & 1 lbs.
”	”	” ” spherl. case 7 in a set.	20	20	11	11	6	6	7, 6, 5, 4, 3½, 2½ & 1¼ oz.
404	”	Mirrors for examining ordnance	4	7½	2	3¾	1	1–14	
411	476	Mortars brass large	6	516	4	344	2	172	Weight of Pestles included.
”	”	” ” small	6		4		2		
404	374	Needles packing	290	7½	160	4	100	2½	½ large and ½ small.
”	”	” sail	580		320		200		
”	”	” sewing	1160		640		400		

Explanatory Table Page.	Page	STORES.	Train No. 1.		Train No. 2.		Train No. 3.	
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.
445	430	Oakum		100		60		40
405	374	Oil, Cocoanut		53		32		20
,,	,,	,, Linseed Country		180		95		58
,,	,,	,, Mustard		187½		112½		75
328	322	Ordnance, Brass, Mortar 5½ inch	10		6		4	
,,	,,	,, Iron, Gun 24 pdr.	12		6		4	
,,	,,	,, ,, ,, 18 ,,	12		6		4	
,,	,,	,, ,, Howr. 10 inch	4		2		1	
,,	,,	,, ,, ,, 8 ,,	6		4		2	
,,	,,	,, ,, Mortar 10 ,,	4		2		1	
,,	,,	,, ,, ,, 8 ,,	10		6		4	
406	376	Paint, prepared, Carriage		708½		376½		230½
407	,,	Palms, Steel	58	4½	32	2½	20	1½
,,	,,	Pans Composition small	32	33	16	16½	8	8¼
,,	,,	,, Copper, drying	17	425	10	250	6	150
408	,,	Paper, country portfire, qurs	58	392	32	235	20	136
,,	,,	,, Europe ,, ,,	58		32		20	
,,	,,	,, Country Cartridge ,,	222		130		78	
,,	,,	,, Europe Foolscap ,,	58		32		20	
409	,,	Pawlins wax, magazine, large	30	5820	20	3380	10	1940
,,	,,	,, ,, ,, small	30		20		10	
,,	,,	,, ,, Camel	30		20		10	
410	,,	Pencils, black lead	58		32		20	
,,	,,	Pendulums, Gunners	6	84	4	56	2	28
411	,,	Pestles, brass, large	6	33¾	4	22½	2	11¼

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight. lbs.	No.	Weight lbs.	
411	376	Pestles, brass, small	6	20·10	4	13¾	2	6.14	
344	365	Pins, Linch, spare	191	149.8	102	80	55	43	
412	376	Pitch, Europe							
446	430	Pickets, Park	200	2200	150	1650	100	1100	
430	446	Platforms, Gun and Howitzer	34		18		11		
"	"	" Mortar	24		14		9		
"	"	" Sleepers, 1st size							⅓ the number in each Platform required spare.
"	"	" " 2d "							
"	"	" Hurters							
"	"	" Planks, 1st size.							
"	"	" " 2d "							
340	322	Poles, Cart, spare	8	272	4	136	2	68	
"	"	" siege Carriage, spare	6	426	4	284	2	142	
419	376	Portfire, Sockets	116	116	64	64	40	40	
412	"	Portfires	6515	2138	3582	1175	2240	735	
393	374	Powder, Cloths	16	368	10	230	5	115	
381	372	" Mealed, Barrels	6		6		6		
"	"	" Musketry "	1039	140265	602	81270	324	43740	
"	"	" Ordnance "	2496	336960	1295	174825	827	111645	
366	344	Pouches, Priming	34	20·13	18	10·9	11	6·4	
"	"	" Cannon	116	319	64	176	40	110	
447	431	Rammers, earth	20	400	15	300	10	200	
415	376	Resin lbs.							
413	"	Rockets, signal 1 lb.	150	178	100	118	50	59	
"	"	" shafts	150		100		50		

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
448	431	Rods, measuring, 10 feet	6	24	4	16	2	8	
”	”	” ” 6 ”	6		4		2		
”	”	Rope, Europe, 5½ inch coils	2	7364	1	3682	1	2548	
”	”	” ” 4 ” ”	10		5		3		
447	”	” ” Ratline	8	1216	5	760	2	304	
415	376	Salamoniac		29		16		10	
”	”	Saltpetre		1800		1100		700	
”	”	Scales, wooden, with Iron beams, large	2	450	1	225	1	225	
”	”	” Copper, with beam, large	6	117	4	78	2	39	
”	”	” ” ” ” medium	6	81	4	54	2	27	
”	”	” ” ” ” small	26	75	15	44	8	23	
417	”	Scissors, Laboratory	58	13	32	7	20	4½	
”	”	Searchers, with relievers, N. P.	3	72	2	48	1	24	
”	”	” single pronged	3		2		1		
41[illegible]	376	Serge pieces.	269	8608	144	4668	89	2848	When the bags are not taken.
449	431	Sheep skins	34	68	20	40	12	24	
382	372	Shells, carcasses, filled 8 inch	250	12500	150	7500	100	5000	
”	”	” ” ” 5½ ”	500	8000	300	4800	200	3200	
”	”	” common, empty, 10 ”	8000	720,000	4000	360,000	2000	180,000	
”	”	” ” ” 8 ”	16000	704000	10,000	440000	6000	264000	
”	”	” ” ” 5½ ”	10000	155000	6000	93000	4000	62000	
”	”	” Shrapnell, filled, 24 pdr	1200	25200	600	12600	400	8400	
”	”	” ” ” 18 ”	1200	18000	600	9000	400	6000	

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
382	372	Shells Shrapuell filled 8 inch........	600	36000	400	24000	200	12000	
,,	,,	Shot loose, round, 24 pdr...........	12000	288000	6000	144000	4000	96000	
,,	,,	,, ,, ,, 18 ,, ...	12000	216000	6000	108000	4000	72000	
419	,,	,, case fixed 24 ,, ...	900	22950	450	11475	300	8650	
,,	,,	,, ,, ,, 18 ,, ...	900	19350	450	9675	300	6450	
,,	,,	,, ,, ,, 10 inch...	400	41100	200	20550	100	10275	
,,	,,	,, ,, ,, 8 inch...........	600	32512	400	21770	200	10885	
420	,,	Grape fixed, coffin's, 24 pdr.........	300	8770	150	4385	100	2925	
,,	,,	,, ,, ,, 18 ,, ...	300	6150	150	3075	100	2050	
418	376	Sieves brass, wire, fine.............	3	113	2	75	1	38	
,,	,,	,, ,, ,, medium..........	3		2		1		
,,	,,	,, ,, ,, coarse.............	3		2		1		
,,	,,	,, Hair.......................	6		4		2		
,,	,,	,, Lawn...................	6		4		2		
,,	,,	,, Leather tops.....	3		2		1		
,,	,,	,, ,, receivers...	3		2		1		
367	344	Sights, gunners.....................	24	3	12	1½	8	1	
423	378	Silk, sewing........	....	77	....	43		26	Sewing cartridges.
421	376	Solder, pewter.....................		87		48		30	
425	,,	Spirits of turpentine...... lbs.	35		20		11		
421	,,	,, ,, Wine ....qts.	175		105		60		
368	344	Spunges, gun..............24 pdr.	24	252	12	126	8	84	
,,	,,	,, ,, ...18 ,,	24	240	12	120	8	80	
,,	,,	,, Howitzer........ 10 inch.	8	100	4	50	2	25	
,,	,,	,, ,, ... 8 ,,	12	102	8	68	4	34	

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2·		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
368	344	Spunges, Mortar	48	220	28	128½	18	82·8	
„	„	„ Washing	24	264	12	132	8	88	
376	410	Stands, pendulum, with plummet	6	234	4	156	2	78	
450	431	Steel, Europe, blistered		58		32		20	
449	„	Stones, grinding, large	2	860	1	430	1	430	
„	„	„ „ trough	2		1		1		
451	451	„ Rag	7	3·1	4	1¾	3	1·5	
„	„	„ Turkey	5	15	3	9	2	6	3 of No. 1,2 of No. 2 & 1 of No.3 to be stocked.
421	376	Sulphur		1000		600		400	
422	„	Tables, Laboratory	3	1008	2	672	1	336	
„	„	„ Mealing	3	558	2	372	1	186	
423	378	Tents, European, P. N. P.	10	6180	6	8708	3	1854	Complete with Poles, Mallets.
„	„	„ Laboratory	2	2654	1	1327	1	1327	Pins, Saletahs &c. &c.
„	„	„ Sepahi 4 paals	1½	1284	1	856	½	428	
„	„	Thread, cotton,		39		24		14	For quick Match.
369	344	Tompions 24 pdr.	12		6		4		
„	„	„ 18 „	12		6		4		
425	378	Twine, country, No. 1		110		70		40	
„	„	„ „ „ 2		250		150		90	
„	„	„ „ „ 3		50		30		15	
439	430	Triangles for Ghurrie	2		1		1		
415	376	„ „ scale large	2	218	1	109	1	109	
„	„	„ „ „ medium	6	264	4	176	2	88	

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight. lbs.	No.	Weight. lbs.	No.	Weight. lbs.	
415	376	Triangles for Scale small..........	6	36	4	24	2	12	
450	431	Tools Adzes Carpenters...........	3	8·4	2	5·8	1	2·12	
452	„	„ „ Coopers (trimming)....	2	6·6	1	3·3	1	3·3	
451	„	„ Anvil large................	5	3650	3	2190	2	1460	
451	„	„ „ small................	3	297	2	198	1	99	
450	„	„ Augers Carpenters..........	18	12.9	12	8.6	6	4.3	$\frac{1}{2}$, $\frac{5}{8}$, $\frac{3}{4}$, $\frac{7}{8}$, 1 and $1\frac{1}{4}$ inch in equal proportions.
„	„	„ Awls brad................	12	1.2	8	0.12	4	0.6	
„	„	„ Axes broad................	3	23.4	2	15.8	1	7.12	With helves.
452	„	„ „ Coopers 12 inch......	2	6.8	1	3.4	1	3.4	
432	429	„ „ felling................	58	754	32	416	20	130	
432	„	„ „ Pick................	58		32		20		
452	431	„ Beak irons Coopers..........	2	13	1	6.8	1	6.8	
„	„	„ „ „ Smiths..........	5	390	3	234	2	156	
398		„ Bellows..................	5	815	3	489	2	326	
435	429	„ Bill hooks................	58	116	32	64	20	40	
		„ Bills spare for stocks......	24	1.4	12	0.10	12	0.10	
		„ „ „ taper............	24	1.8	12	0.12	12	0.12	Not in nomenclature.
452	431	„ Bolsters..................	2	1.8	1	0.12	1	0.12	
„	„	„ Borers Bung..............	4	12	2	6	2	6	
„	„	„ „ Tap..................	4	2	2	1	2	1	
451	„	„ Braces Smiths..............	3	4.11	2	3.2	1	1.9	
„	„	„ Callipers iron..............	3	1.8	2	1	1	0.8	
452	„	„ Checquered holed..........	2	0.14	1	0.7	1	0.7	With helve and claw.
450	„	„ Chisels firmer sizes..........	24	16.11	16	11.2	8	5.9	

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight. lbs.	No.	Weight. lbs.	No.	Weight. lbs.	
450	331	Tools Chisels Mortise	9	8.4	6	5.8	3	2.12	
„	„	„ „ Socket	18	16.8	12	11	6	5.8	From ⅝ to 1¾ inches.
451	„	„ „ Cold or hard	54	3.14	33	20 4	21	12	Including chisels rod.
450	„	„ Compasses with sweep	11	8.10	7	5.4	4	3.2	15, 14, 12 and 5 inch in equal proportions.
„	„	„ „ „ spring	20	....	11	....	6		
451	„	„ Countersinks for braces	3	0.3	2	0.2	1	0.1	
452	„	„ Crowstocks for Butts 2 irons	2	....	1	....	1		
„	„	„ „ „ Kilderkins	2	....	1	....	1	....	Not in nomenclature.
„	„	„ „ „ Rundlets	2	....	1	....	1		
451	„	„ Cutters anvil	8	....	5	....	3		
„	„	„ Drills, bows complete	3	....	2	....	1		
452	„	„ Drivers	12	23	6	11.8	6	11.8	[inches.
451	„	„ Files flat	36	26.13	24	17.14	12	8.15	¼ of 14, 12, 10 and 8
451	„	„ „ ½ round	57	36.12	3	23.4	21	13.8	
452	„	„ „ Herringbone	12	....	6	....	6	....	
451	„	„ „ 3 square	36	21	24	14	12	7	½ of 14 and 10 inches.
„	„	„ „ ½ round Bastard cut	9	6.12	6	4.8	3	2.4	⅓ of 12, 10 & 8 inches.
452	„	„ „ saw	100	8.5	58	4.10	36	3	
450	„	„ Gimblets common	60	2.8	36	1.8	24	1	
„	„	„ „ spike	6	1.3	4	0.13	2	0.6	
„	„	„ Gouges common Carpenters	3	1.2	2	0.12	1	0 6	
„	„	„ „ Mortice	3	1	2	0.11	1	0.5½	
„	„	„ Gouges firmer sizes	9	5.10	6	2 12	3	1.14	
„	„	„ „ Socket	9	8.1	6	5.6	3	2.12	⅓ of ¾ 1 and 1¼ inches

Explanatory Table. Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight. lbs.	No.	Weight. lbs.	No.	Weight. lbs.	
451	431	Tools Hammers broad	3	....	2	....	1		
450	"	" " Handclaw	5	10 12	3	6.7	2	4.5	With handles.
"	"	" " Hand	12	40.8	7	23.10	5	16.14	" "
"	"	" " Rivetting	6	9	4	6	2	3	" " [square.
451	"	" " Setting	16	53	10	33.2	6	19.14	Including side and
"	"	" " Sledge	13	170	8	104	5	66	
361	344	" " Wrench	58	266.5	32	147.3	20	92	
450	431	" Handles for tools (files)	66	10.5	42	6.9	24	3 12	
"	"	" Hatchets hand, with handles	61	139	34	77.2	21	47.10	
	324	" Helves for Axes	One for each and ⅓ spare.						
	"	" " " Hammers sledge							
	"	" " " Mamooties							
452	431	" Howels Coopers	4	....	2	....	2		
"	"	" Irons chincing	6	....	3	....	3		
"	"	" " Flagging	4	7	2	3.8	2	3 8	
		" " Tue	5	75	3	45	2	30	Nose pipe for bellows.
452	431	" " Marking sets	4	1.12	2	0.14	2	0.14	
"	"	" Jiggers	4	2	2	1	2	1	
450	"	" Knives drawing	5	6.4	3	3.12	2	2.8	
452	"	" " heading	2	3.8	1	1.12	1	1.12	
"	"	" " hollowing	4	6.12	2	3.6	2	3.6	
"	"	" " cleaning	4	11.4	2	5.10	2	5.10	With handles.
451	"	" Mallets	3	6	2	4	1	2	
444	430	" Mamooties	58	464	32	256	20	160	" helves.
451	431	" Nippers	3	3.6	2	2.4	1	1.2	

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight	No.	Weight lbs.	
451	431	Tools, Pincers....................	5	5.12	3	3.7	2	2.5	
„	„	„ Planes, fore, double iron	3	11.4	2	7.8	1	3.12	
„	„	„ „ Jack „ „........	5	22.8	3	13.9	2	9	
„	„	„ „ „ single „.......	3	10.7	2	7.10	1	3.13	
„	„	„ „ Jointers..............	5	120	3	72	2	48	
451	„	„ „ Philister.............	3	5 4	3	2.8	1	1.12	
„	„	„ „ Plough (8 irons).....	3	8.4	2	5.8	1	2.12	
„	„	„ „ Rebating	6	6.15	4	4.10	2	2.5	½ of ½ and 1 inch
452	„	„ „ Smoothing double iron.	3	7.2	2	4.12	1	2.6	
„	„	„ „ „ single „.......	5	8 12	3	5.4	2	3.8	
	„	„ „ Heading or tapping. ..	2		1		1		
„	„	„ „ Trying double iron....	3	16.8	2	11	1	5.8	
451	„	„ Plyers..................	3		2		1		
„	„	„ Pokers..................	8	14	5	8.12	3	5.4	
„	„	„ Pots, Glue................	3	6.3	2	4.2	1	2.1	
„	„	„ Punches, Carpenter........	18	1.2	12	0.12	6	0.6	
452	„	„ Punches, Smiths...........	66	73.4	42	47	24	26.4	
„	„	„ Rasps, flat................	40	28.9	22	16	12	8.8	
451	„	„ „ ½ round.............	21	24.15	12	14.4	9	10.11	4 inch
„	„	„ Rimers, square	6	1.2	4	0.12	2	0.6	for braces
„	„	„ Rules, box, wood, 2 ft. brass slides	12	2.10	4	0.14	2	0.7	
452	„	„ „ Coopers, 4 feet........	2	0.12	1	0 6	1	0 6	Guages
451	„	„ Saws, hand................	5	9.11	3	5.13	2	3.14	
452	„	„ „ Compass.............	2	2	1	1	1	1	
451	„	„ „ Sash................	3	1.11	2	1.2	1	0 9	

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs.	No.	Weight lbs.	
452	431	Tools Saw Setter	45	5.10	25	3.2	14	1.12	
451	"	" " Tennon	43	75	22	45.3	13	17.10	or dovetail
"	"	" Screw, Drivers	6	4.8	4	3	2	1,8	
"	"	" " Plates, large	3	30.6	2	20.4	1	10.2	with 5 plugs and 2 taper taps
"	"	" " " medium	5	46.8	3	27.8	2	19	
"	"	" " " hand	3	5.4	2	3.8	1	1.12	with 14 taps
452	"	" Shaves, round, 1 handle	4	6.8	2	3.4	2	3.4	
"	"	" " " 2 "	4	5.8	2	2.12	2	2.12	
451	"	" " Spokes, Carpenter	6		4		2		1/3 belly over cross & tapping large and small 1/3 of each slices
452	"	" " " Coopers	6		3		3		
451	"	" Shovels, Smiths	8	18.12	5	11.4	3	7.8	
449	"	" " Common	25	125	15	75	10	50	
451	"	" Squares, Iron	3	3	2	2	1	1	figured 18 inch
449	"	" Spades, common	25	125	15	75	10	50	
451	"	" Squares with steel blades	3		2		1		
"	"	" Stocks, centre, with 24 bits	3	10.11	2	7.2	1	3.9	
452	"	" " dowelling	2		1		1		
451	"	" Tongs, smiths	30	129.8	19	82	11	47.8	
"	"	" Vices, Bench	6	55.2	4	36.12	2	18.6	
452	"	" " Coopers brass	16	3.8	8	1.12	7	1.9	
"	"	" " " sheave	2		1		1		
451	"	" " hand	6	7.8	4	5	2	2.8	
"	"	" " standing	3	150	2	100	1	50	

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight lbs.	No.	Weight lbs	No.	Weight lbs.	
427	378	Tubes	78180	439	43020	217	26880	151	
425	"	Wads 24 pdr.	36000	36000	18000	18000	12000	12000	⅔ round & ⅓ compressed
"	"	" 18 "	36000	28800	18000	14400	12000	9600	" " " " "
369	344	Washers, iron drag	34	101.2	18	53.12	11	32.14	Exclusive of those on carriages
427	378	Wax, bees		200		110		60	
452	431	" cloth, new pieces	58	428	32	238	20	149	
	324	Wheels, wooden, spare Field Car	16	3616	8	1808	4	904	
	"	" " siege "	6		4		2		
"	"	" " " Limber	6	2712	4	1808	2	904	
423	378	Worsted		58		32		22	when quill tubes are used
428	"	Wrappers, Curwah 24 pdr.	4000	2240	2000	1120	1350	756	
"	"	" " 18 "	4000		2000		1350		
370	344	Wrenches, iron, small	57	399	29	203	17	119	
"	"	" " large	34	680	18	360	11	220	
371	344	Yokes Pole or Trace	764	30560	406	16240	219	8760	
415	376	Weights brass from 7lbs to 1 dr. sets	26	388.14	15	224.8.13	8	121.8.8	
"	"	" " " 28 " " 1oz "	6	341.10	4	228	2	113.14	
"	"	" " " 14 " " 1dr	6	174.5.14	4	115.15.12	2	58.15	
"	"	" Iron 56lbs	40	2240	20	1120	20	1120	
"	"	" " 28 "	2	56	1	28	1	28	
"	"	" " 14 "	2	28	1	14	1	14	
"	"	" " 7 "	2	14	1	7	1	7	
"	"	" " 4 "	2	8	1	4	1	4	
"	"	" " 2 "	2	4	1	2	1	2	

Explanatory Table Page.	Page.	STORES.	Train No. 1.		Train No. 2.		Train No. 3.		
			No.	Weight. lbs.	No.	Weight lbs.	No.	Weight. lbs.	
415	376	,, ,, 1 ,,..................	2	2	1	1	1	1	
,,	,,	,, ,, ½ ,,......	2	1	1	0.8	1	0 8	

(Signed) S. SHAW, Lieut.-Col. Commandant.
,, R. POWNEY, Lieut.-Col. P. C. O.
,, G. BLAKE, Major.
,, G. DYKE, Capt. D. P. C. O.
,, E. H. LUDLOW, Capt. Comy. Ordce.
,, E. BUCKLE, Bt. Capt. A. A. G. A.

Fort William,
Mily. Bd. Office,
9th Sept. 1841.

(Signed) ARTHUR BROOME,
Officiating Secretary Military Board.

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